



# TEXAS CoCoRaHS OBSERVER

## Spring 2017



*"Because every drop counts, as do all Zeros."*

## Spring Weather Summary

**Welcome to the Texas CoCoRaHS Observer newsletter.**

The purpose of this newsletter is to keep observers informed of the latest news, events and happenings related to the CoCoRaHS program here in Texas, as well as news about the latest weather patterns affecting each region of Texas.

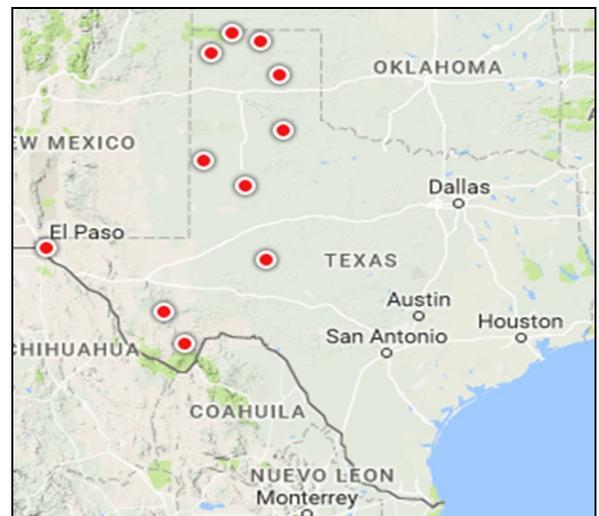
If you have questions, comments or suggestions, feel free to contact us via the emails listed on the back page.

**By: John Nielsen-Gammon  
Texas A&M University  
Texas State Climatologist**

The relative warmth of winter continued into spring, but temperatures eventually got back to normal. March's average temperature was 63.7 °F, the second-warmest on record behind the ridiculous early spring of 1907. April was also a bit warmer than normal, but the run of eight consecutive months of above-normal temperatures in Texas came to an end in May, when 72.0 °F was 1.2 °F cooler than normal.

Despite the relative coolness of May, the springtime average temperature across Texas still made it into the historic top ten with 67.6 °F. The historic records go back to 1895.

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**Locations of stations breaking their all-time March highest recorded temperatures. Map by the National Centers for Environmental Information.**

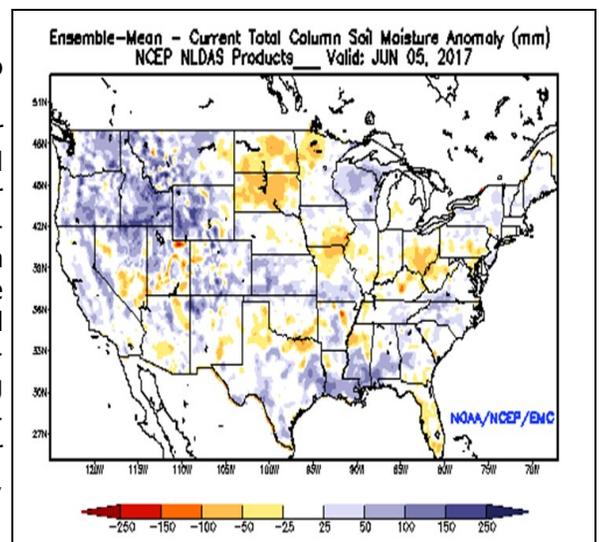
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## Hot and dry summer forecast??

**By Bob Rose  
Meteorologist, Lower Colorado River Authority**

When you think of summer weather in Texas, heat, humidity and long stretches of dry sunny weather often come to mind. The heat and humidity can often become unbearable in the months of July and August. The weather is rarely ever pleasant and cool, so putting together a Texas summer weather outlook involves finding out the degree of heat that can be expected along with the degree of dry or wet weather. The humidity? Well, that's a given. CONTINUED PAGE 3—>



FROM Page 1—>historic records go back to 1895.

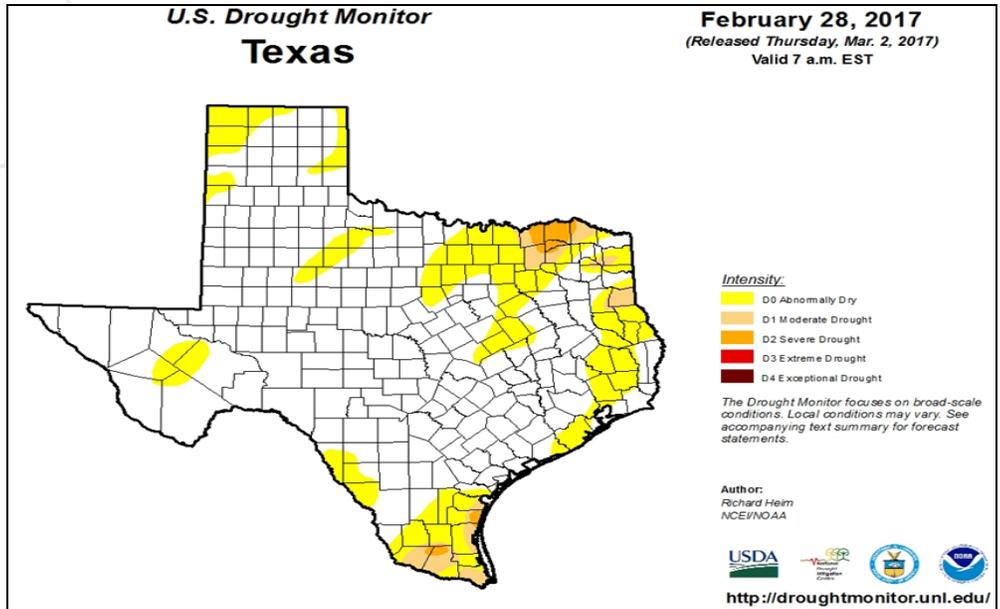
Speaking of historic, it's not too surprising that the March warmth brought some new temperature records. The broken records were at locations in West Texas. April and May were milder, but there is one interesting temperature record of note: Brownsville reached 104 °F on April 26. In 117 years of weather records at Brownsville, this is the fourth-highest temperature ever recorded. Their all-time record is 106 °F, set in March (!) 1984. Why March and April? The super-warm days in the Lower Valley occur when the wind is from the southwest and hot dry air descends from the Mexican Plateau. In the summertime, the wind is just too reliably blowing from the Gulf of Mexico.

Galveston, meanwhile, continued its daily record-setting ways, driven largely by record warm temperatures in the Gulf of Mexico. Since November 1, 2016, it had set 45 new maximum temperature records and 30 new (high) minimum temperature records.

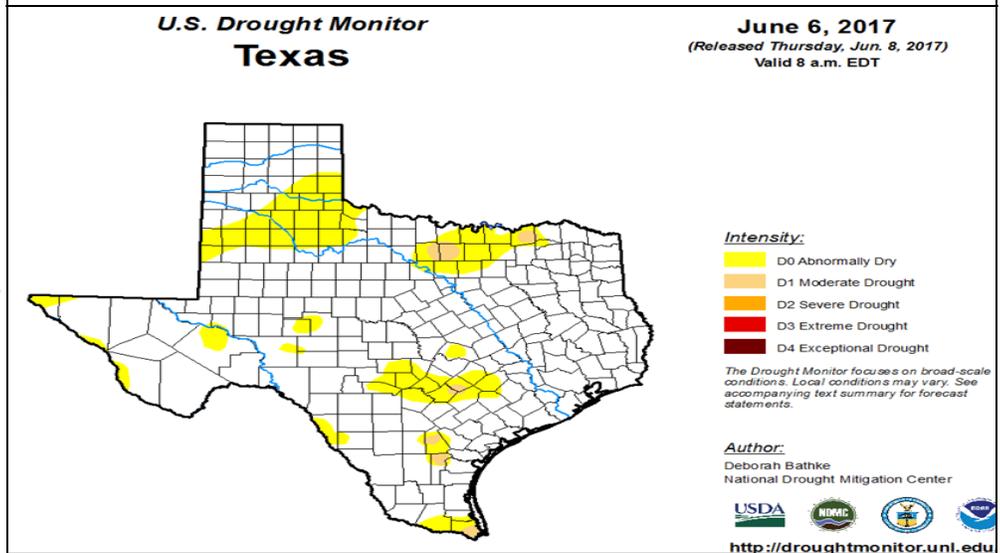
When I last wrote, less than 4% of the state was in moderate or worse drought.

As of the beginning of June, that number is down to 1.2%. Concerns about widespread drought are reduced somewhat by a reasonably wet spring in many parts of the state, but as we move into the hottest time of the year, conditions can dry out quite quickly.

June is climatologically one of the wettest months of the year in much of the state, and July is the driest. This makes June especially critical for mak-

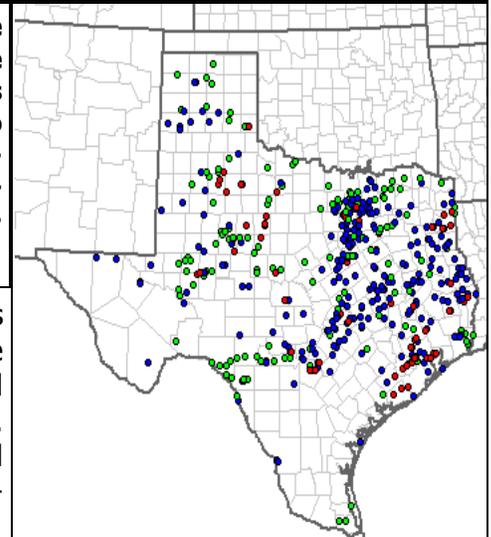


**Drought monitor as of February 28, 2017,. Parts of Northeast Texas along with the Rio Grande Valley had the worst drought .Map provided by the National Drought Mitigation Center, University of Nebraska at Lincoln.**



**Above: Drought monitor as of June 6, 2017. Drought conditions have improved in the Rio Grande Valley as well as in northeast Texas, thanks to generous spring rainfall.. Map provided by the National Drought Mitigation Center, University of Nebraska at Lincoln.**

-ing it through the summer. At this point, areas to keep an eye on include San Antonio and the southern and eastern parts of the High Plains. Hopefully CoCoRaHS observers will have more to do than just record zeros .



## Summer Outlook

FROM PAGE 1—>Coming out of spring and heading into summer this year, there has been no strong driver in the atmosphere. Neither El Nino nor La Nina has been present. While sea surface temperatures in the tropical Pacific have been running warmer than normal since late winter, these waters have had a hard time connecting with the atmosphere to develop an El Nino. In fact, the probability for El Nino development this summer and fall has recently decreased and it appears the Pacific will most likely remain in a neutral state through summer and early fall.

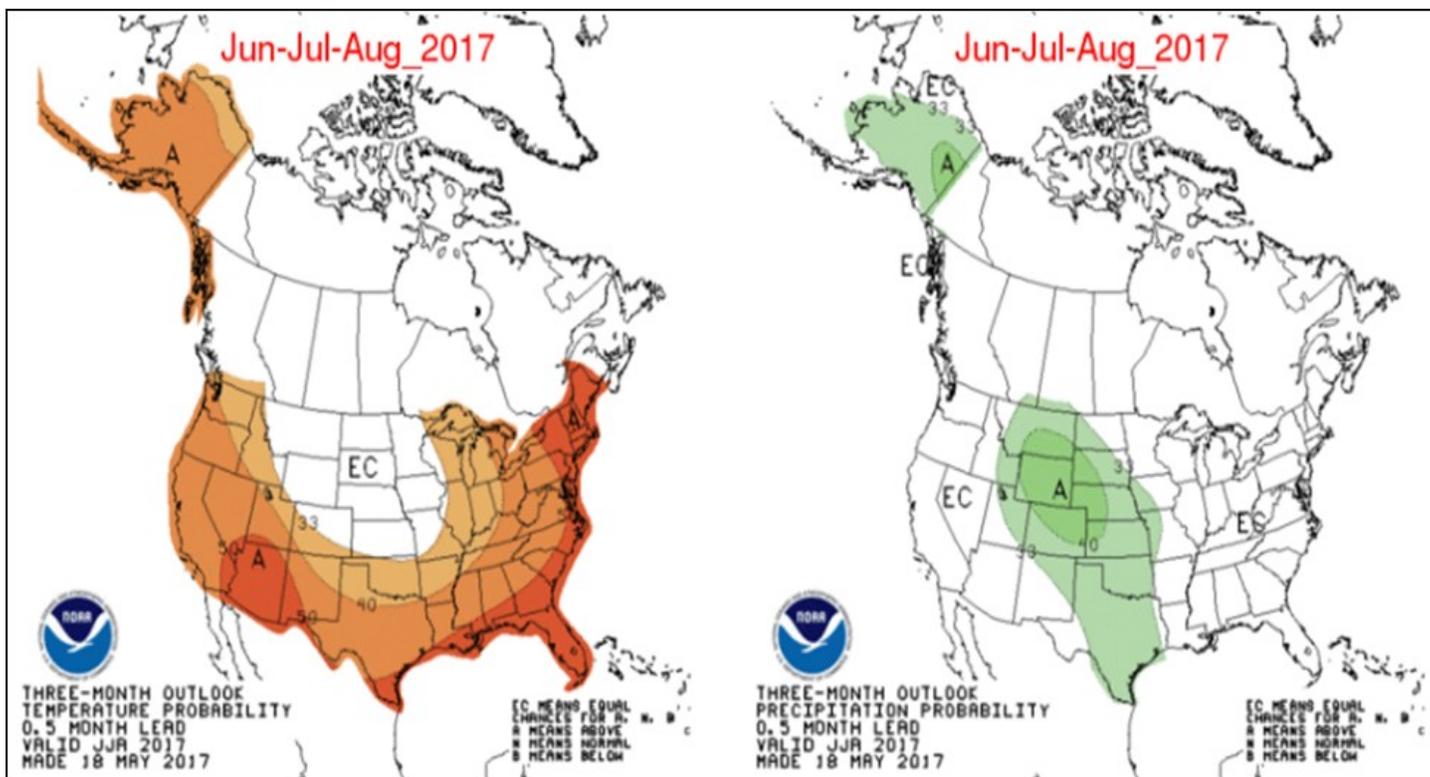
Without a strong influence from the tropical Pacific, forecasters have to look at other smaller oscillations in the oceans and the atmosphere, and factors such as soil moisture, for clues as to how the summer weather pattern will set up across Texas. These clues oftentimes will shed light on where the persistent "summertime ridge of high pressure" will set up. When this ridge of high pressure sets up over Texas, the chances for very hot and very dry weather increase dramatically. On the other hand, when the ridge is forecast to set up away from Texas, temperatures are often not as brutally

hot and rainfall is a little more plentiful. The map on page 1 shows soil moisture levels across the lower 48 states.

Looking at all of the various sources of forecast data for this summer, the outlook for Texas calls for increased probabilities for warmer than normal temperatures along with slightly above normal rainfall during June, July and August

The big news is the all-important summertime ridge of high pressure is not expected to set up and persist across Texas for extended periods of time this summer. This should not only provide more variability to the summer weather pattern, but it should lower the probability for extended stretches of extremely hot and dry weather.

Temperatures are forecast to be moderately hot this summer, but not record-setting hot. Additionally, without the persistent ridge of high pressure in place, Texas should see more opportunities for scattered rain showers and thunderstorms, leading to near normal or even slightly above normal rainfall.



**Outlook from the NOAA/NWS Climate Prediction Center for the months of June-July-August. All of Texas has at least a 33% chance or higher of having a warmer than normal summer, though the good news is most of the state also has at least a 33% chance of above normal precipitation.**

# Central Texas Regional Summary

**By Larry Hopper  
National Weather Service-Austin/  
San Antonio**

After an exceptionally warm winter, South Central Texas continued the trend with a spring that was characterized by above normal temperatures. The first five months of the year have been the warmest on record for the South Central Texas Climate Division, surpassing the previous average temperature record of 67.2°F in 2000 by 0.8°F. In terms of precipitation, Spring 2017 was the ninth wettest on record at Del Rio, which received 10.12 inches of rain. However, it was a drier than normal spring for both Austin and San Antonio, which registered their 28<sup>th</sup> driest and 58<sup>th</sup> driest springs on record, respectively. Spring 2017 was also fairly quiet with regards to severe weather due to a relatively persistent capping inversion, with only a few severe weather and higher impact flash flooding events.

March picked up right where February left off. Temperatures were well above normal at all major climate sites. March 2017 was the warmest on record in Austin, whereas Del Rio and San Antonio experienced their tenth and 12<sup>th</sup> warmest Marches on record, respectively. Rainfall was near-normal for all three climate sites in March. Showers and thunderstorms on Thursday, March 9<sup>th</sup> stalled across portions of Comal, Guadalupe, Wilson and Gonzales Counties, dropping large amounts of rainfall in a short period of time. The CoCoRaHS site at New Berlin 6.7 mi. SE in southern Guadalupe County reported 6.32 inches of rain from this event, causing a flash flood on the Cibolo and Santa Clara Creeks that led to one fatality in Cibolo on the Santa Clara Creek.

April was again characterized by above normal temperatures at Austin, San Antonio and Del Rio, but the anomalies were not as great as in March. Rainfall was near normal for Austin and San Antonio, but Del Rio experienced its fourth wettest April on record. Showers and thunderstorms impacted Del Rio into the southern

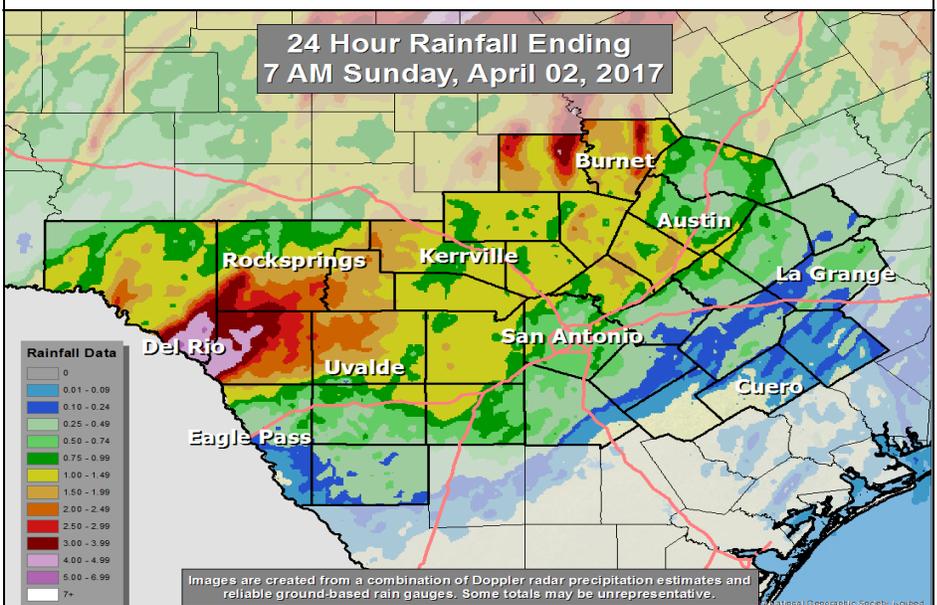
Edwards Plateau and Hill Country on Sunday, April 2<sup>nd</sup>. Del Rio International Airport received 5.07 inches of rain on April 2<sup>nd</sup>, which set a daily and monthly record along with being the earliest 5 inch rain event on record. The most impactful rainfall event occurred on Tuesday, April 11<sup>th</sup>, as numerous thunderstorms formed and trained over San Marcos, dropping 3-9 inches of rain across the city in about three hours. The maximum rainfall total occurred at the CoCoRaHS site at San Marcos 4.1 mi. WSW where 8.66 inches of rain was reported. This caused flash flooding on the San Marcos River, the Comal River, and Purgatory Creek, prompting Texas State University to cancel classes.



**Damage to structures in Elgin caused by an EF-0 tornado on May 23rd.**



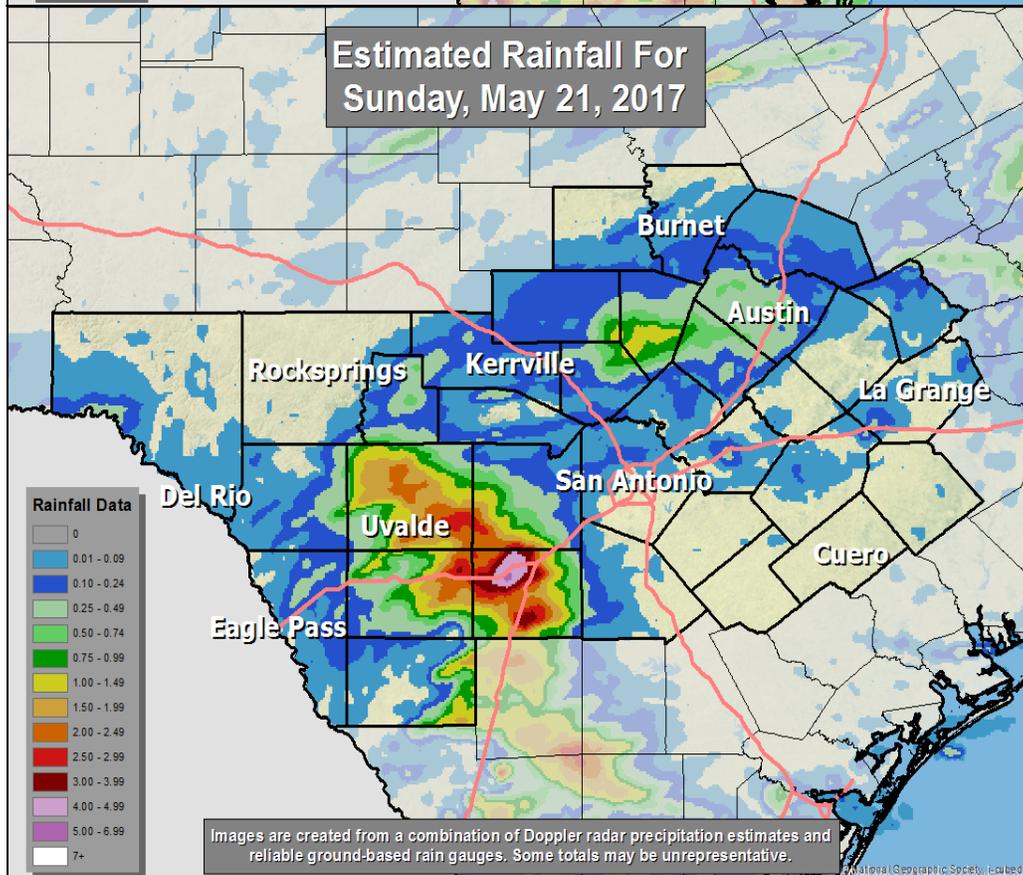
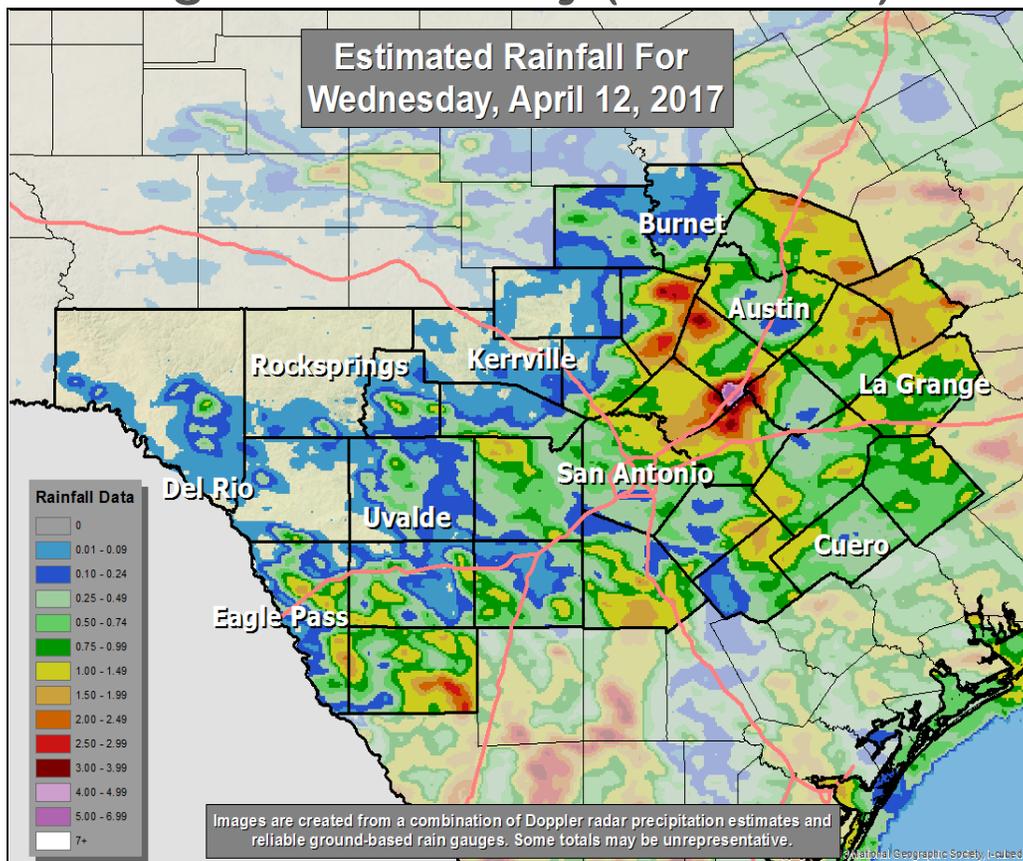
**Above right: 4 to 9 inches of rain fell within a three hour period in San Marcos on April 11th, causing flooding along rivers and creeks.**



# Central Texas Regional Summary (continued)

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After a scorching start to the spring, temperatures were near to slightly below normal during May at Austin, San Antonio and Del Rio. Austin and San Antonio were also below normal for rainfall, but Del Rio experienced its 22<sup>nd</sup> wettest May on record. A series of slow-moving thunderstorms dropped heavy rain across portions of Frio, Uvalde, Medina and Zavala Counties on Saturday, May 20<sup>th</sup>. The maximum rainfall total received was from the CoCoRaHS station at Pearsall 10.2 mi. NW in northwestern Frio County, which reported 10.02 inches of rainfall in 24 hours. The most impactful non-flooding severe weather event of the season occurred on the afternoon of May 23<sup>rd</sup>. A severe thunderstorm formed over the Cedar Park/Round Rock area north of Austin and evolved into a bow echo. This bow echo traveled east-southeast through the cities and communities of Pflugerville, Elgin, Giddings, and Warrenton, causing widespread wind damage. A measured wind gust of 75 mph occurred near Giddings, snapping large oak trees. The bookend vortex of the bow echo also produced 1.8 mile long, EF-0 tornado just north of Elgin. The tornado caused damage to numerous structures and trees along with throwing several cows about 1500 feet from one pasture into another, jumping a couple of fences in the process. The cows were knocked unconscious, but luckily they were able to survive.



## Heavy rain event along Texas Coastal Bend

### By National Weather Service- Corpus Christi

Strong to severe thunderstorms with heavy rainfall and flooding impacted South Texas from the evening on May 28<sup>th</sup>, 2017 through the early morning hours on May 29<sup>th</sup>. After the storms moved offshore into the Gulf of Mexico, strong pressure falls were observed over South Texas, with strong pressure rises noted over the Gulf waters. This produced strong easterly winds across the Coastal Bend and adjacent waters. As a result, brief but significant coastal flooding occurred over portions of the Middle Texas coast. Below is a brief overview of how this event transpired.

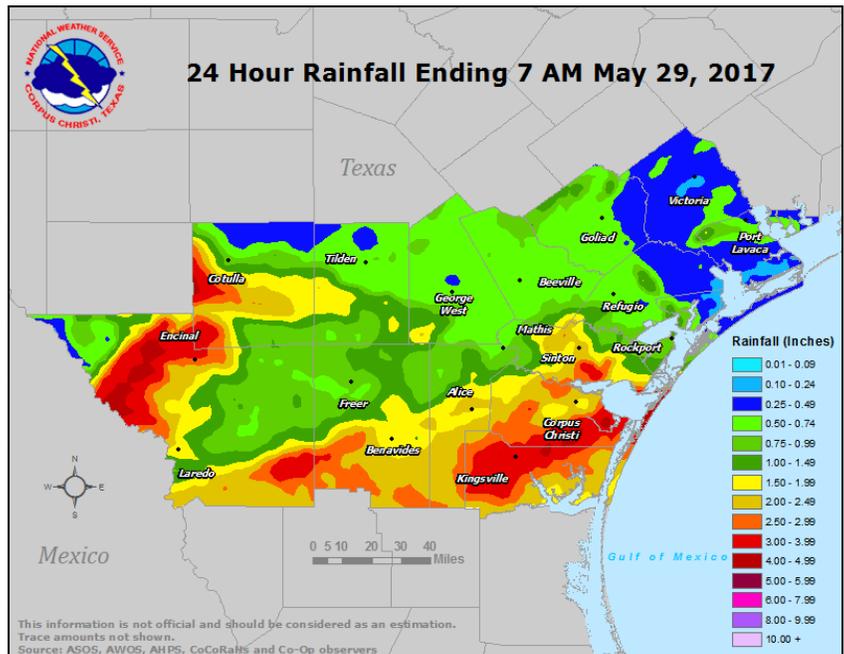
During the afternoon of May 28<sup>th</sup>, 2017, thunderstorms began to develop over the Texas Hill Country along a frontal boundary, due to strong daytime heating and very unstable conditions. Also, an upper level disturbance aided the thunderstorm potential. As a result, strong to severe thunderstorms began to develop over the Brush Country by early that evening. Golf ball sized hail was reported over Northwest Webb County that evening.

By the early morning of May 29<sup>th</sup>, a line of thunderstorms with strong winds and heavy rainfall developed over the Brush Country. These storms moved eastward through the remainder of the Brush Country and into the Coastal Bend before 300 AM CDT. As these storms moved through Alice, the observing station at the airport reported 70 mph wind gusts. Along with the strong gusty winds, very heavy rainfall and flooding occurred as the storms moved into the cities of Kingsville and Corpus Christi. At times, the northern leading edge of the squall line was showing rotation, and tornado warnings were issued for portions of Duval and Kleberg County. As the storms approached the coast, Special Marine Warnings were issued for the southern Bays and nearshore waters. Widespread wind gusts of 40 to more than 60 mph were observed behind this line of thunderstorms.

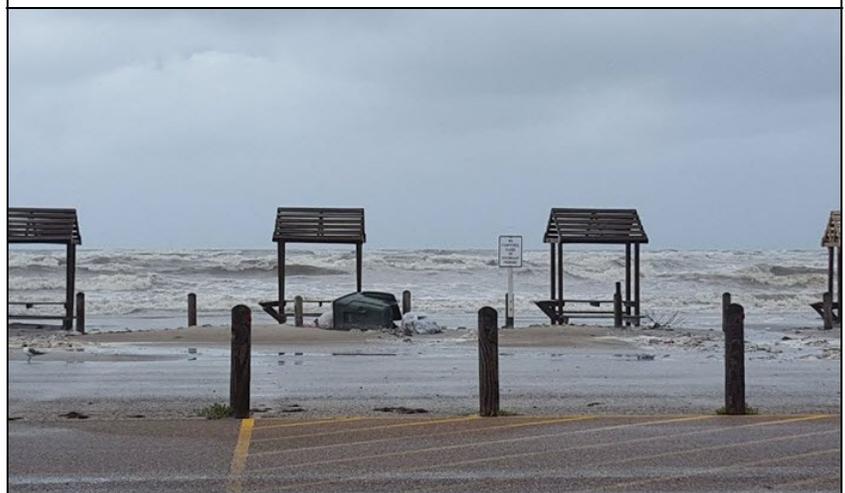
Although the concern for severe weather and flooding ended when the storms moved into the Gulf waters, this event had one final episode. Due to the strong storms which moved through the area, pressures rapidly rose over the Brush Country while pressures fell rapidly over the Coastal Bend and Southeast TX. As the atmosphere attempted to adjust from this pressure rise/fall couplet, winds over the coastal areas increased dramatically. At 900 AM, a wind gust of 61 mph was reported at Port Aransas, with many

other coastal areas experiencing wind gusts of 45 mph or more.

Because of these strong onshore winds (occurring at the time close to high tide), tidal levels at Bob Hall Pier rose from around 1 foot MSL to nearly 3 feet MSL in about 2 hours! Because of this, coastal flooding was observed for a few hours near and south of the pier. Coastal Flood warnings and Gale warnings were issued for coastal areas and the Gulf waters due to these strong gradient winds. Finally, by the afternoon on the 29<sup>th</sup>, winds, seas, and tides had subsided and conditions over South Texas became more tranquil.



**Rainfall totals compiled from CoCoRaHS reportw, Coop observers and other automated stations.**



**Rough seas and some flooding near Bob Hall Pier.**

## Midland-Odessa regional weather summary

**By Jim DeBerry  
Meteorologist/Hydrology  
Program Manager  
National Weather Service-  
Midland-Odessa**

West Texas and Southeast New Mexico saw a productive spring, with average severe weather and fairly abundant rainfall during the latter half of the season.

In March, the synoptic pattern began transitioning from winter to spring, but hydrologic activity was on the dry side. Monthly radar rainfall estimates ranged from less than 0.10" in Eddy and western Culberson Counties to 4-5" over the lower Trans Pecos. Highest observed rainfall was in the 1.25-1.50" range, however. Average rainfall was only around 0.25". No flooding events were reported.

April saw more hydrologic activity as the spring synoptic pattern further established itself. Only one flash flooding event was observed, on April 13<sup>th</sup>, when a supercell flooded many farm roads and low water crossings in eastern Terrell County. Monthly radar rainfall estimates ranged from less than 0.10" in southwest Presidio County to 5-6" over the Western Low Rolling Plains, and other isolated locations. Highest observed rainfall was in the 3.25-3.75" range, however. Average rainfall was around 1.30".

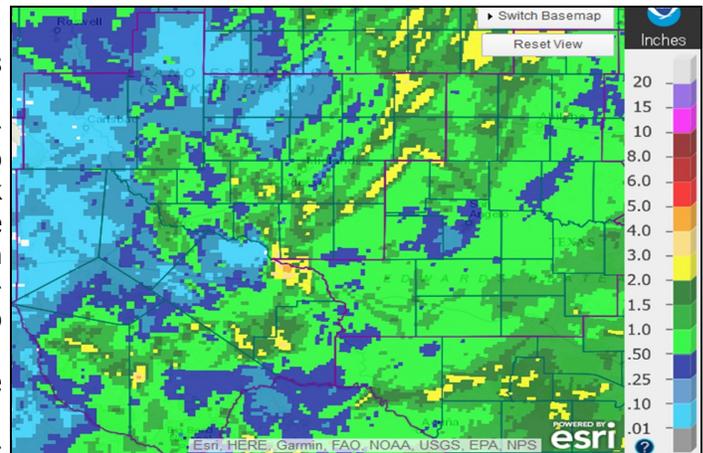
May saw abundant rainfall for much of the HSA, especially during the latter half of the month. Early in the morning of May 19<sup>th</sup>, thunderstorms initiated along the dryline near Odessa in Ector County, and trained eastward along I-20 for the rest of the morning. Up to 1' of runoff flooded Hwy 307 in

Greenwood in Midland County. Thunderstorms then moved on to Mitchell County, where many roadways in and around Colorado City, Loraine, and Westbrook were rendered impassable and barricaded. 3-4" of rain fell in some places. Champion Creek Reservoir filled to just over 50% conservation capacity, the first time since 1997.

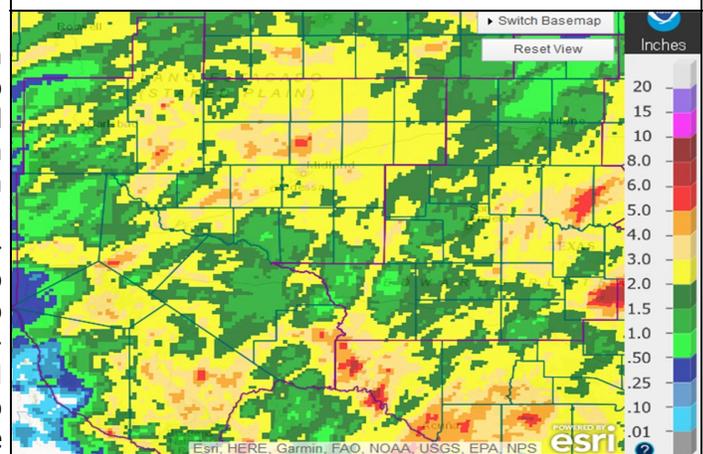
On the 21<sup>st</sup>, slow-moving thunderstorms produced 3-4" of rainfall directly over Big Bend National Park. This sent a flash flood down Terlingua Creek into the Rio Grande, sending a 17+' flood wave through Castolon (CSTT2), then later through Johnson Ranch (TELT2).

On May 30-31<sup>st</sup>, thunderstorms formed over Mexico in a line roughly parallel to the Rio Grande, from Presidio to the Big Bend. A flood wave coming down the Rio Conchos briefly pushed the Rio Grande into flood at Presidio, but the river responded with elevated flows downstream as far as Dryden.

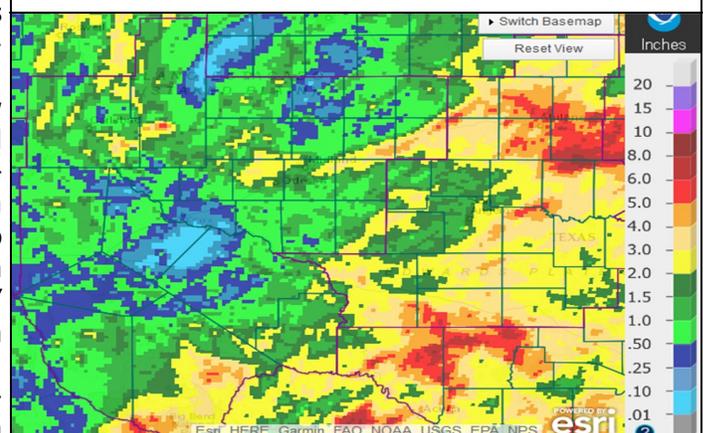
To bring in the new month, on the afternoon and evening of the 31<sup>st</sup>, thunderstorms developed from Carlsbad in New Mexico to the Permian Basin. Urban street flooding of up to 1.5' of runoff was reported in Odessa in Ector County. Monthly radar rainfall estimates ranged from less than 0.10" in southeast Reeves and northwest Pecos Counties to 5-6" over the Big Bend, and other isolated locations. Highest observed rainfall was in the 4.25-4.75" range, however. Average rainfall was around 0.75".



**Radar estimated rainfall for March 2017**



**Above: Radar estimated rainfall for April 2017**



**Above: Radar estimated rainfall for May 2017**

Overall, Spring 2017 leaves West Texas and Southeast New Mexico in good shape for the upcoming summer. Area reservoirs are at over 55% conservation capacity. No drought exists, although a few isolated areas of West Texas are classified as abnormally dry.

## Flooding swamps Amarillo

**By Angie Margrave  
National Weather Service-Amarillo**

On Friday, June 2<sup>nd</sup> 2017, plenty of moisture was being brought northwest on southeast surface winds. The winds aloft were very light. A small upper level disturbance was nearly stationary just to the southwest of Hereford, TX. This disturbance teamed up with the abundant moisture to help produce thunderstorms across the south central and southwest Texas Panhandle Friday afternoon. The activity initially developed over western Potter and western Randall Counties into eastern Oldham and eastern Deaf Smith Counties. The thunderstorms moved very slowly west away from Amarillo. Then an outflow boundary started moving east from the initial activity. More storms started to develop eastward behind the eastward moving boundary. The heavy rain producing thunderstorms slowly moved and developed eastward into the western half of Amarillo. The thunderstorms then remained almost stationary or slowly drifted off to the south. The intense rainfall (at least 2 inch an hour rainfall rates) fell over the western half of Amarillo and caused flash flooding in this area. Rainfall amounts were generally in the 2 to 4 inch range with locally higher amounts. All of the rain fell in less than a 2 hour time span. On Saturday, the 3<sup>rd</sup>, an upper level disturbance moved southward toward the panhandles. This disturbance helped to produce heavy rain producing thunderstorms again over western and central Amarillo. Rainfall amounts were generally in the 1 to 2 inch range.



**Top Right: Flooding along Soncy Road, in the SW side of Amarillo**

**Center Right: Flood waters cover the mainlanes of Interstate 27 near the 45th Street in Amarillo**

**At right: Another picture of flood waters gathering near Interstate 27 and 45th Street.**

**Photos by: Mike Gittinger, Warning Coordination Meteorologist, National Weather Service-Amarillo**

## Bryan-College Station Weather Summary

**By: John Nielsen-Gammon,**

**Texas A&M University**

**Texas State Climatologist, Regional Co-CoRaHS Coordinator**

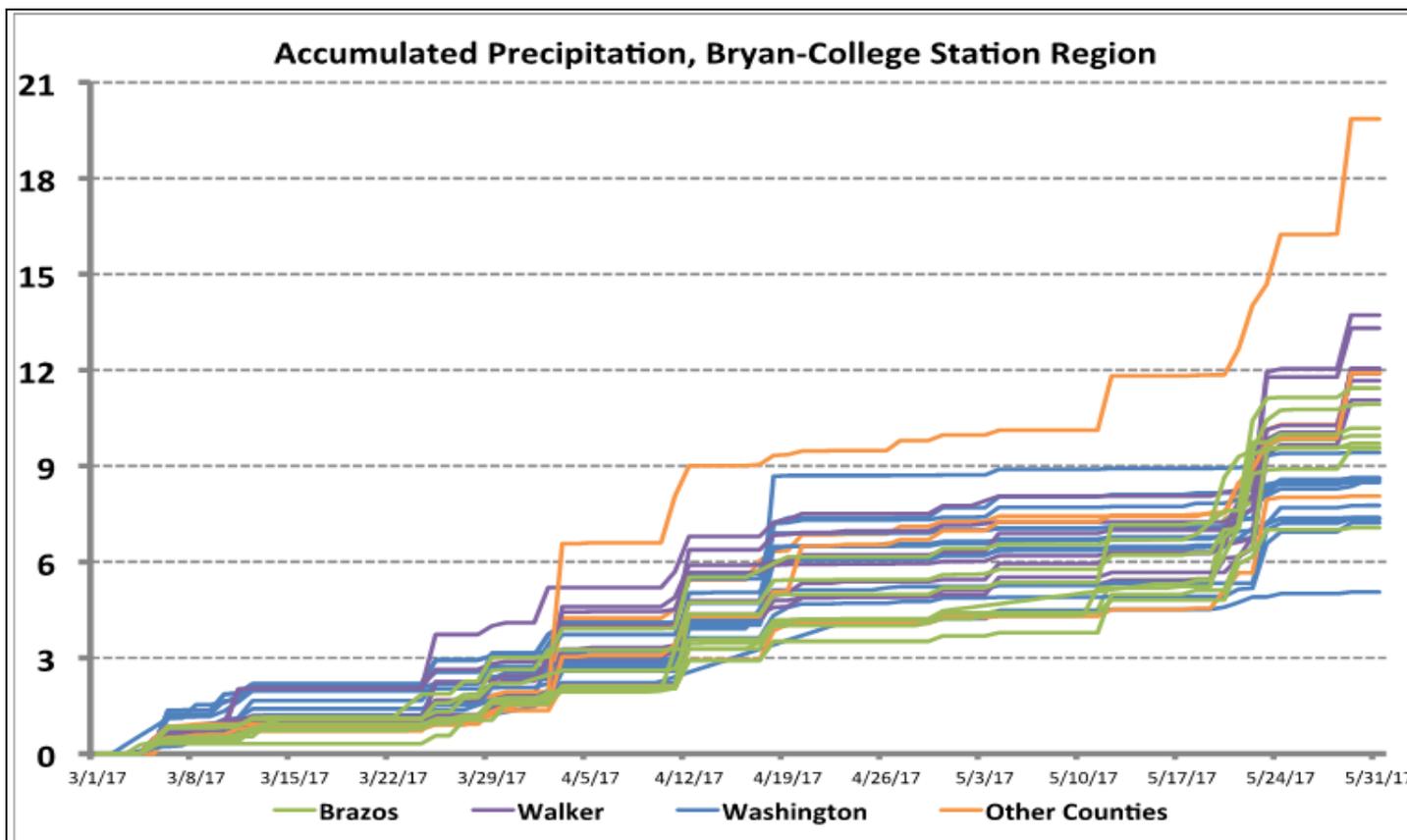
Spring 2017 started out ridiculously warm, but ended somewhat cool compared to normal. Rainfall in spring is normally about 11 inches. The eastern parts of the region received the most, while southern parts received the least.

This season's statistics: There were 44 active CoCoRaHS observers during the period, a gain of two since the winter. Of those, 9 submitted observations on all 92 days (congratulations!), 1 missed only a day, and 12 missed two to ten days. Many of those made up for the gaps with multi-day precipitation totals (thank you!). Of the remaining 22, it seems that 9 submitted reports on most or all rainy days, so their seasonal rainfall totals are probably reliable.

This makes a total of 31 active CoCoRaHS observers with apparently reliable data. Most are concentrated in just three counties.

As the graph of total rainfall shows, much of March was dry, making for good wildflower viewing weather, late March through mid-April was wetter, then turned largely dry again until late May. Houston County managed to be wettest overall. Among the highlights from the observations:

- Wettest day: 4.68", April 3 (Houston County)
- Wettest seasonal total: 19.86" (Houston County)
- Longest spell of days with measurable rain: 10 (Washington County)
- Longest spell of days without measurable rain: 18 (Trinity County)



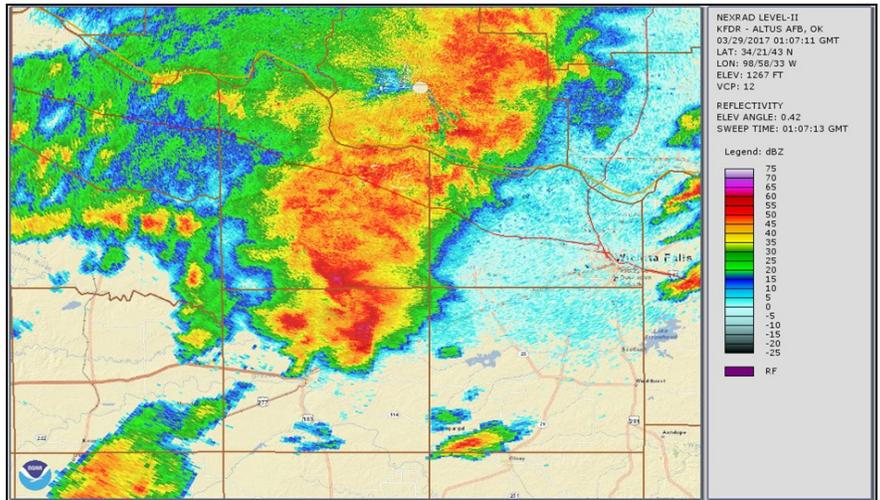
# Wichita Falls regional weather Summary

**By Charles Kuster  
CIMMS/NSSL**

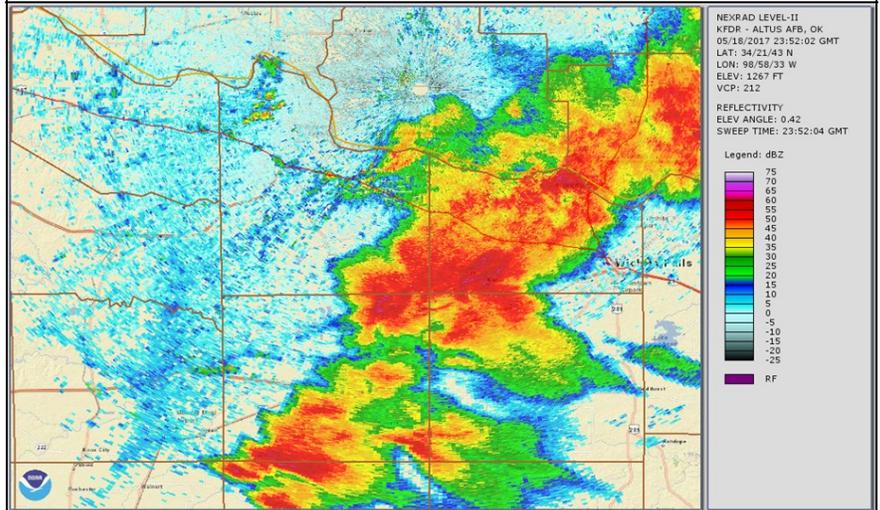
The spring season started off slowly this year with 23 straight dry days (i.e., no CoCoRaHS stations reporting over 0.05 inches). This streak ended on March 24, but the first relatively significant severe weather event of the year occurred four days later when scattered thunderstorms produced tennis ball-sized hail and a tornado in Baylor County (Fig. 1). Golf ball-sized hail was also reported in Wichita County. Heavy rainfall occurred during this event as well especially across Hardeman, Foard, and Knox County where most CoCoRaHS stations reported 2–4 inches of rain.

Another period of active severe weather and heavy rain occurred on May 18–19. Multiple supercell thunderstorms spawned tornadoes in Wilbarger and Archer County and produced baseball-sized hail in Wichita County (Fig. 2). Rainfall totals varied widely across the region during the two-day period, with some CoCoRaHS stations in Wichita County seeing over 2 inches on May 19 while other stations farther west saw 0.10 inches or less.

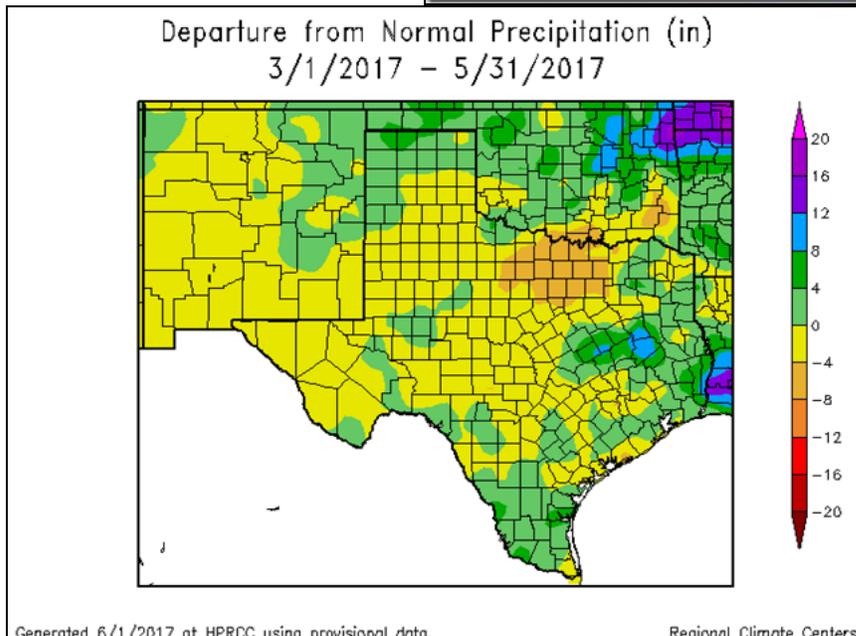
Overall, the region saw near normal or slightly below normal precipitation (Fig. 3) and dry days outnumbered wet days 75 to 17. On average, May was the region’s wettest month and April was the driest. The entire region did experience well above normal temperatures this spring as well.



**Figure 1. Radar imagery of severe storms in the area on March 28, 2017 at 8:07 pm CDT**



**Figure 2 (Above): Radar imagery of severe storms in the area on May 18, 2017 at 6:53 pm CDT .**



**Figure 3 (Left): Departure from normal precipitation for March 2017 through May 2017. Warm colors indicate below normal precipitation.**

## Severe Thunderstorm hammers Laredo

**By Juan Alanis**

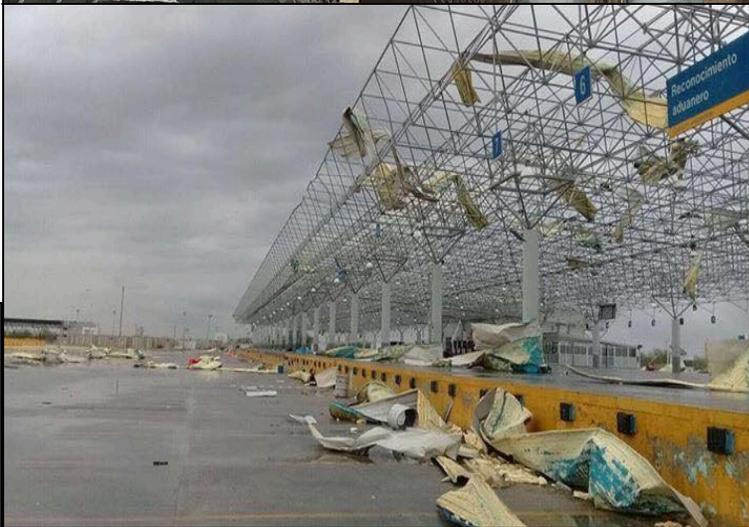
**Webb County CoCoRaHS Coordinator**

On May 21nd, the Storm Prediction Center had placed the Texas border region from the Big Bend to Laredo under a "slight risk" of severe weather due to a very unstable air mass present.

Storms began to fire rapidly in the Mexican mountains during the late afternoon and move eastward toward the border. Around dinner time on May 21st, a severe thunderstorm hits northern sections of Laredo bring large hail, heavy rains and straight line winds of 80mph. The winds caused extensive damage to homes and businesses across NW Laredo, including extensive damage to the city's World Trade Bridge, forcing it's closure.

In the aftermath of the storm, tens of thousands were left without power, many for several days and United ISD schools were closed to assess damage.

One fatality was recorded due to the storm. A teenager was electrocuted due to a fallen power-line in the city's Hillside area.



**Top Right:** Straight line winds cause significant damage to homes in Laredo's Mines Road area.

**At right:** Extensive damage to facilities at the World Trade Bridge in NW Laredo.

Photos taken by Followers of South Texas Weather Updates



**Above:** Homes under construction in Laredo's Villa San Agustin subdivision destroyed by severe thunderstorms on May 21st.

**Right:** Major flooding at I-35 and Del Mar Blvd in Laredo due to severe thunderstorms.



# Southeast Texas Climate Summary

**By Ron Havran**

**CoCoRaHS Houston/Galveston Regional Coordinator**

March climate highlights

Temperatures much above normal by more than 5.5 to 7 degrees region wide.

Rainfall above normal central counties.

Below normal rainfall coastal and northern areas.

Isolated very heavy rainfall over southern Harris and northeastern Brazoria counties for the month.

Significant rainfall days in the region on the 5<sup>th</sup>-7<sup>th</sup>, 11<sup>th</sup>, 24<sup>th</sup>, and the 29<sup>th</sup>.

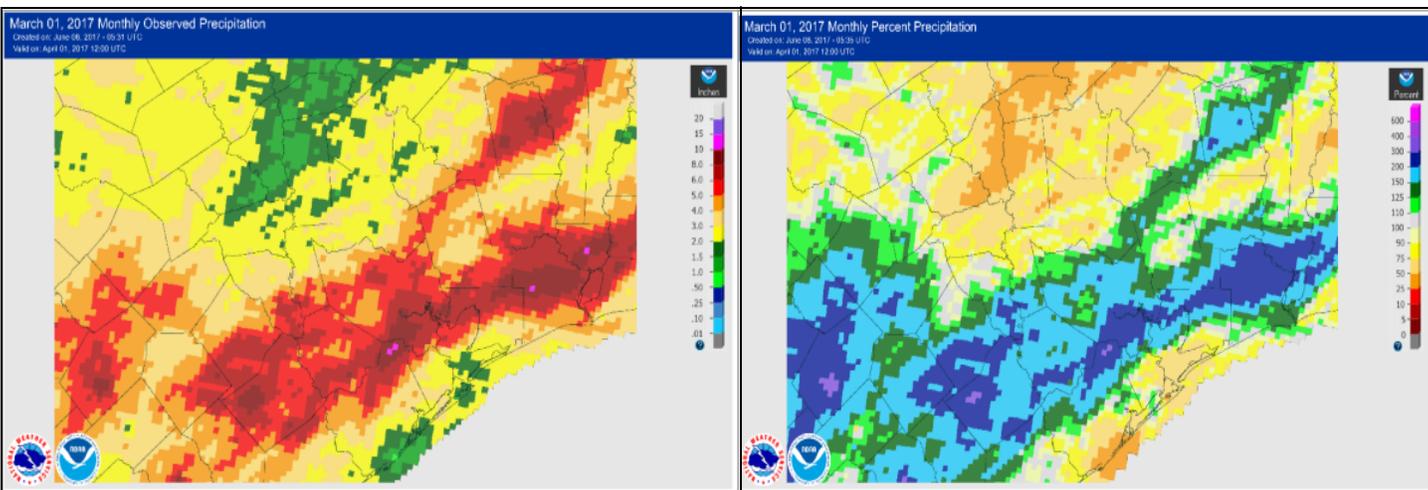
Small EF-0 tornado on the 24<sup>th</sup> in Harris County near Baytown.

4 tornadoes in Harris County (3 EF-1 and 1 EF-0), 1 EF-0 tornado in Chambers County, and 1 EF-0 tornado in Liberty County on the 29<sup>th</sup>.

CoCoRaHS observer county region wide rainfall average of 3.64".

Highest CoCoRaHS county rainfall average was Fort Bend with 5.17".

Lowest CoCoRaHS county rainfall average was Montgomery with 1.85".



**Radar estimated precipitation (left) and percent of normal precipitation (right) for March 2017**

April climate highlights

Temperatures averaged near normal to slightly above normal in the region.

Coastal counties such as Galveston County had much above normal temperatures.

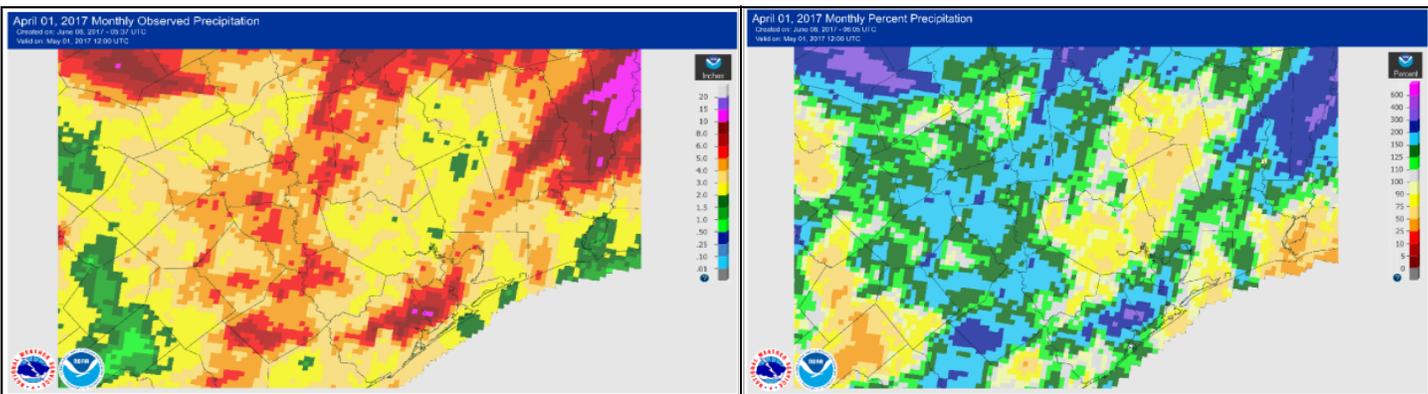
Rainfall was below normal in the central counties such as Harris and Liberty counties.

The northwestern and southwestern counties had normal to slightly above normal rainfall.

Significant rainfall days in the region on the 1<sup>st</sup>-2<sup>nd</sup>, 11<sup>th</sup> - 12<sup>th</sup>, 17<sup>th</sup> - 19<sup>th</sup>.

CoCoRaHS observer county region wide rainfall average of 3.53".

Highest CoCoRaHS county rainfall average was Galveston with 4.90".

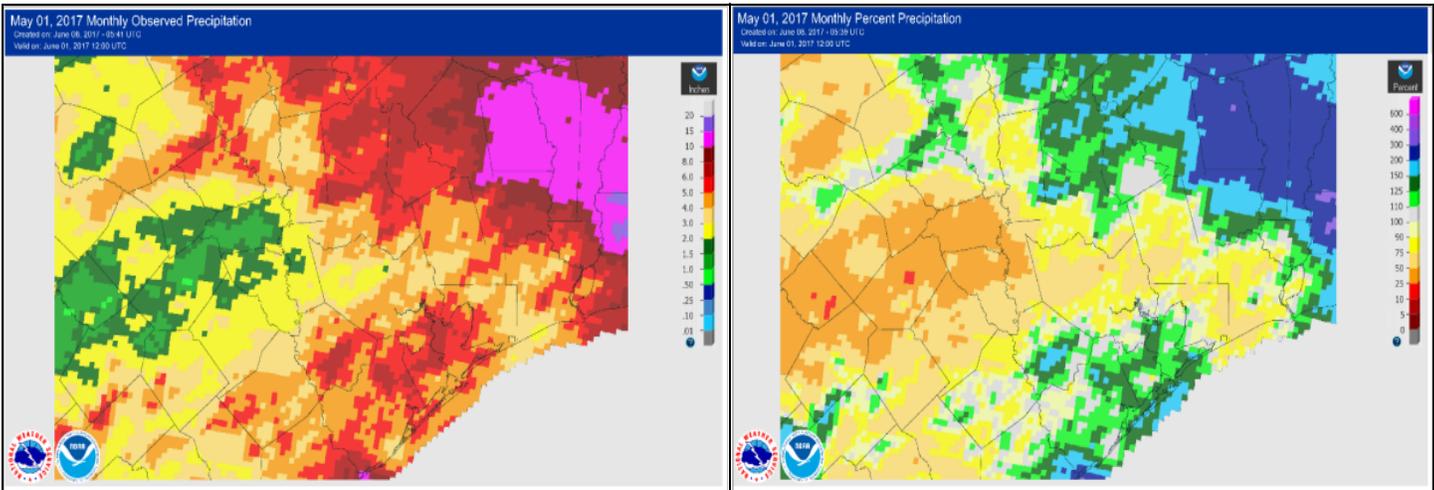


**Radar estimated precipitation (left) and percent of normal precipitation (right) for April 2017**

CONTINUED FROM Page 12

May climate highlights

Most of the region had average temperatures within 1.5 degrees of normal. Daytime highs were in the 90's the last week of the month after being held in the eighties due to a few cool fronts. Rainfall was below normal in the western counties such as Austin (2.08"), Colorado (2.37"), and Waller (2.30") counties. Southern counties and far northern counties had rainfall near normal to just slightly above normal in a few spots. Significant rainfall days in the region on the 11<sup>th</sup>, 20<sup>th</sup> – 23<sup>rd</sup>, 28<sup>th</sup>- 29<sup>th</sup>, and the 31<sup>st</sup>. One EF-0 tornado in Fort Bend County/Waller County line on the 21<sup>st</sup>. One EF-0 tornado in Brazoria County and 1 EF-0 tornado in Galveston County on the 22<sup>nd</sup>. CoCoRaHS observer county region wide rainfall average of 4.44". Highest CoCoRaHS county rainfall average was Polk with 5.85". Lowest CoCoRaHS county rainfall average was Austin with 2.08". Significant severe weather event on the evening of the 23<sup>rd</sup> over western, southwestern and southern counties.



**Radar estimated precipitation (left) and percent of normal precipitation (right) for May 2017**

Spring highlights

Three month spring CoCoRaHS observer county rainfall average was 11.61". Galveston and Fort Bend counties had the highest 3-month CoCoRaHS rainfall average with both having 13.91".

**Spring 2017 CoCoRaHS Houston/Galveston Region Rainfall**

County Rainfall Average and County Station Rainfall Maximum Total in inches per month

County	March		April		May		Spring Total
	AVG.	MAX.	AVG.	MAX.	AVG.	MAX.	
Austin	3.56	7.18	4.43	5.73	2.08	3.26	10.07
Brazoria	3.24	10.75	3.78	4.27	5.66	6.44	12.68
Chambers	N/A	7.98	N/A	3.38	N/A	3.29	N/A
Colorado	2.94	3.25	3.35	3.80	2.37	2.85	8.66
Fort Bend	5.17	6.05	3.64	5.42	5.10	6.89	13.91
Galveston	4.52	6.76	4.90	5.79	4.49	6.76	13.91
Harris	4.78	9.88	3.29	5.27	3.65	5.01	11.72
Jackson	N/A	5.20	N/A	3.17	N/A	5.13	N/A
Liberty	3.77	4.73	2.33	2.55	4.11	4.41	10.21
Matagorda	N/A	2.34	N/A	1.79	N/A	3.71	N/A
Montgomery	1.85	2.54	3.29	4.77	4.53	8.27	9.67
Polk	2.69	4.23	2.47	3.69	5.85	6.60	11.01
San Jacinto	2.46	2.57	3.04	3.45	5.83	6.58	11.33
Waller	N/A	5.01	N/A	3.76	N/A	2.30	N/A
Wharton	5.03	6.76	4.28	5.24	3.13	3.54	12.44
<b>Region Totals</b>	<b>3.64</b>	<b>10.75</b>	<b>3.53</b>	<b>5.79</b>	<b>4.44</b>	<b>8.27</b>	<b>11.61</b>

**Severe thunderstorms move rapidly across central and southeast Texas**

**By Ron Havran  
CoCoRaHS Houston/Galveston Regional Coordinator**

On the evening of May 23<sup>rd</sup> 2017 a thunderstorm developed in central Texas near Elgin over Bastrop/Lee counties area. This thunderstorm quickly became severe early on with severe weather being reported in the Elgin area around 4:40pm CDT. The storm developed very quickly in the late afternoon hours in a region that had abundant sunshine most of the day. This region of clear skies was due to a shortwave trough that had moved through region early that morning and eventually off the upper Texas coast with showers and a few thunderstorms. The weather behind this shortwave set the stage for instability to build during the day with lots of sunshine ahead of a cold front over northcentral Texas. The Storm Prediction Center issued a Mesoscale Discussion #817 at 2:34pm CDT concerning the potential for severe weather by evening time and need for a possible watch. (See below)

Mesoscale Discussion 0817  
NWS Storm Prediction Center Norman OK  
0234 PM CDT Tue May 23 2017

Areas affected...Portions of central TX

Concerning...Severe potential...Watch possible

Valid 231934Z - 232130Z

Probability of Watch Issuance...40 percent J/kg through the peak of the diurnal heating cycle.

SUMMARY...Some increase in severe potential should occur over the next several hours, with isolated large hail and damaging winds the main threats. Watch issuance is possible.

DISCUSSION...19Z surface analysis shows a cold front extending from northeast to central TX, continuing into west TX. Surface pressure falls of 2-4 mb per 2 hours across central TX ahead of the front suggest large-scale ascent attendant to a southeastward-moving shortwave trough over the southern High Plains is overspreading the discussion area. Some elevated convection has recently developed behind the front, likely associated with the shortwave trough. As these thunderstorms move quickly east-southeastward, they will have some potential to become surface based. Clearing ahead of the front has allowed for diurnal heating to destabilize the airmass across the warm sector of central TX. Latest RAP Mesoanalysis indicates MLCAPE of 500-1000 J/kg has developed this afternoon. Further heating may allow MLCAPE values to approach 1500 J/kg through the peak of the diurnal heating cycle.

Northwesterly low-level winds strengthen with height, supporting effective bulk shear values of 45-50 kt. Convective coverage and evolution remains somewhat unclear this afternoon across central TX and vicinity. But, consensus of short-term guidance points to an increasing potential for supercell development over the next several hours along and ahead of the front, with large hail and damaging winds both possible. Depending on convective trends this afternoon, watch issuance is possible.

**A Severe Thunderstorm Watch was issued at 3:30pm CDT for portions of central and southeast Texas.**

URGENT - IMMEDIATE BROADCAST REQUESTED  
Severe Thunderstorm Watch Number 259  
NWS Storm Prediction Center Norman OK  
330 PM CDT Tue May 23 2017

The NWS Storm Prediction Center has issued a

\* Severe Thunderstorm Watch for portions of central and southeast Texas

\* Effective this Tuesday afternoon and evening from 330 PM until 1100 PM CDT.

\* Primary threats include...

**Scattered large hail and isolated very large hail events to 2 inches in diameter possible**  
**Scattered damaging wind gusts to 70 mph possible**

SUMMARY...Scattered thunderstorms now forming across parts of central Texas are expected to increase in coverage and intensity while developing eastward and southeastward toward mid and upper Texas coastal areas through this evening. Strongest activity will be capable of producing severe hail and potentially damaging surface gusts.

The severe thunderstorm watch area is approximately along and 80 statute miles north and south of a line from 15 miles southwest of San Antonio TX to 50 miles south southeast of Tyler TX. For a complete depiction of the watch see the associated watch outline update (WOU564 KWNS WOU9).

AVIATION...A few severe thunderstorms with hail surface and aloft to 2 inches. Extreme turbulence and surface wind gusts to 60 knots. A few cumulonimbi with maximum tops to 500. Mean storm motion vector 29035.



**The NWSFO in Houston issued an update on twitter about this developing storm at 5:28pm CDT.**



**Radar image of thunderstorm gaining supercell characteristics at 6:00pm CDT near Giddings.**

## Severe thunderstorms move rapidly across central and southeast Texas

CONTINUED FROM Page 14—>Following is a chart of severe weather reports with time, location, and severe weather occurring from 6:00pm CDT to 8:10pm CDT along the track of this severe supercell thunderstorm that reached that category around Giddings at 6:00pm CDT.

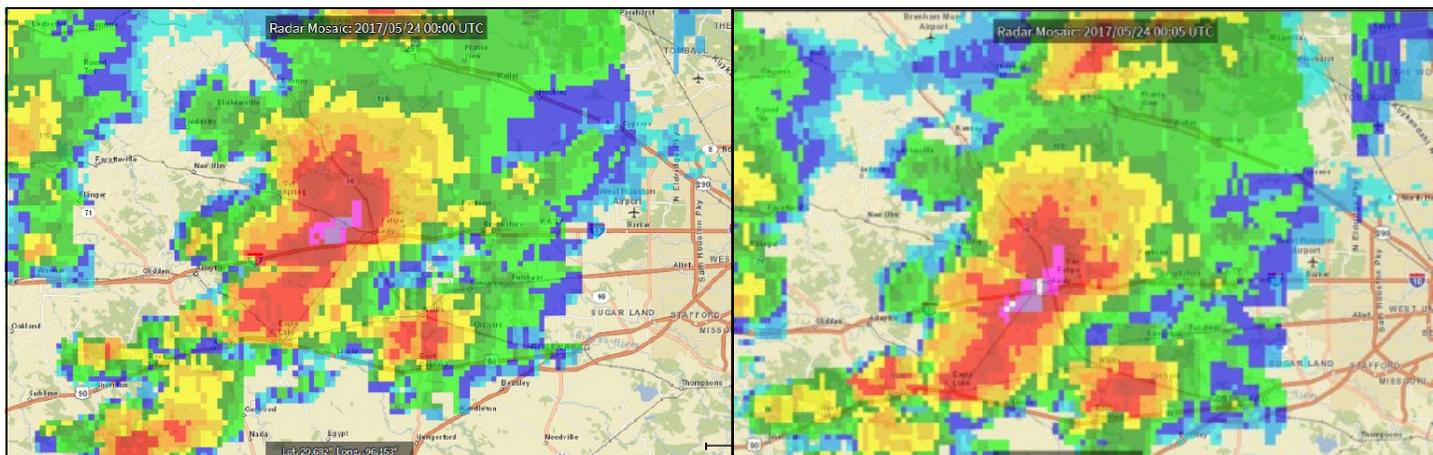
Storm Reports on the evening of May 23, 2017 pertaining to track of severe supercell							
Time (CDT)	Speed	Location	County	State	Lat	Lon	Comments
6:00pm	75mph	GIDDINGS	LEE	TX	30.18	-96.93	STORM SPOTTER MEASURED 75 MPH WIND GUST IN GIDDINGS. ALSO REPORTED QUARTER SIZED HAIL. TIME ESTIMATED FROM RADAR. (EWX)
6:01pm	UNK	1 S GIDDINGS	LEE	TX	30.17	-96.93	REPORTS OF LARGE OAK TREES SNAPPED ON THE SOUTH SIDE OF GIDDINGS. (EWX)
6:18pm	UNK	2 WSW WALHALLA	FAYETTE	TX	30.01	-96.79	FAYETTE COUNTY EM REPORTS DAMAGE TO TREES AND A STRUCTURE WEST OF WARRENTON. (EWX)
6:35pm	UNK	12 N COLUMBUS	COLORADO	TX	29.87	-96.55	PART OF FM-109 IN FRELSBURG BLOCKED BY A DOWNED TREE. (HGX)
7:00pm	UNK	1 SW SEALY	AUSTIN	TX	29.76	-96.17	OFF DUTY NWS EMPLOYEE REPORTS CAR WINDOWS BLOWN OUT AND PART OF A ROOF BLOWN OFF AT SEALY HIGH SCHOOL (HGX)
7:00pm	UNK	SEALY	AUSTIN	TX	29.77	-96.15	18-WHEEL TRUCK BLOWN OVER ON I-10 NEAR SEALY REPORTED BY OFF-DUTY NWS EMPLOYEE. (HGX)
7:00pm	60mph	6 NW SEALY	AUSTIN	TX	29.82	-96.24	TREE LIMBS AND FENCES DOWN. (HGX)
7:15pm	UNK	SIMONTON	FORT BEND	TX	29.68	-96	MULTIPLE REPORTS OF DAMAGE OUT OF SIMONTON INCLUDING LARGE LIMBS DOWN. .. ROOF DAMAGE... AND POWER LINES DOWN VIA FBCSO TWITTER (HGX)
7:25pm	UNK	BEASLEY	FORT BEND	TX	29.5	-95.92	FORT BEND CO SHERIFFS OFFICE REPORTS A TRAMPOLINE AROUND A LIGHT POLE AND FENCE DOWN IN BEASLEY VIA TWITTER (HGX)
7:30pm	UNK	5 SSW THOMPSONS	FORT BEND	TX	29.42	-95.65	NUMEROUS LARGE TREES DOWN IN NEEDVILLE SUBDIVISION. (HGX)
7:31pm	61mph	2 SSW ROSENBERG	FORT BEND	TX	29.52	-95.81	MESONET OBSERVATION SITE MEASURED 61 MPH GUST (HGX)
7:50pm	UNK	ARCOLA	FORT BEND	TX	29.5	-95.46	LARGE TREE LIMB DOWNED ON TOP OF AN SUV ON MASTERSON STREET NEAR THE DISNEY STREET INTERSECTION. (HGX)
8:10pm	UNK	3 SE FRIENDSWOOD	GALVESTON	TX	29.48	-95.16	SERIES OF FENCES BLOWN DOWN IN WESTERN LEAGUE CITY ALONG MAPLE LEAF BETWEEN LEAGUE CITY PKWY AND 528. (HGX)

As this supercell continued in a southeast direction its forward speed increased to near 60mph as it approached Austin County. As the supercell approached the Sealy area just before 7:00pm CDT a photographer 3 miles NE of Sealy took several pictures and video of the supercell that had taken on the appearance of a microburst at the forward flank downdraft of the supercell. See picture below left of the leading edge of the microburst just before the storm hit the I-10 area in Sealy taken at 6:57pm CDT View is looking to WSW towards Sealy which is 3 miles away.



# Severe Thunderstorms pound Sealy

CONTINUED FROM Page 15—>The radar image below left is at 7:00pm CDT about the same time the picture on the previous page was taken. The photographer was looking WSW right at the leading edge in the image below left.



The next image above right shows when the microburst was at its strongest on radar echo intensity levels taken at 7:05pm CDT.

The following is the NWS survey of damage in the Sealy area

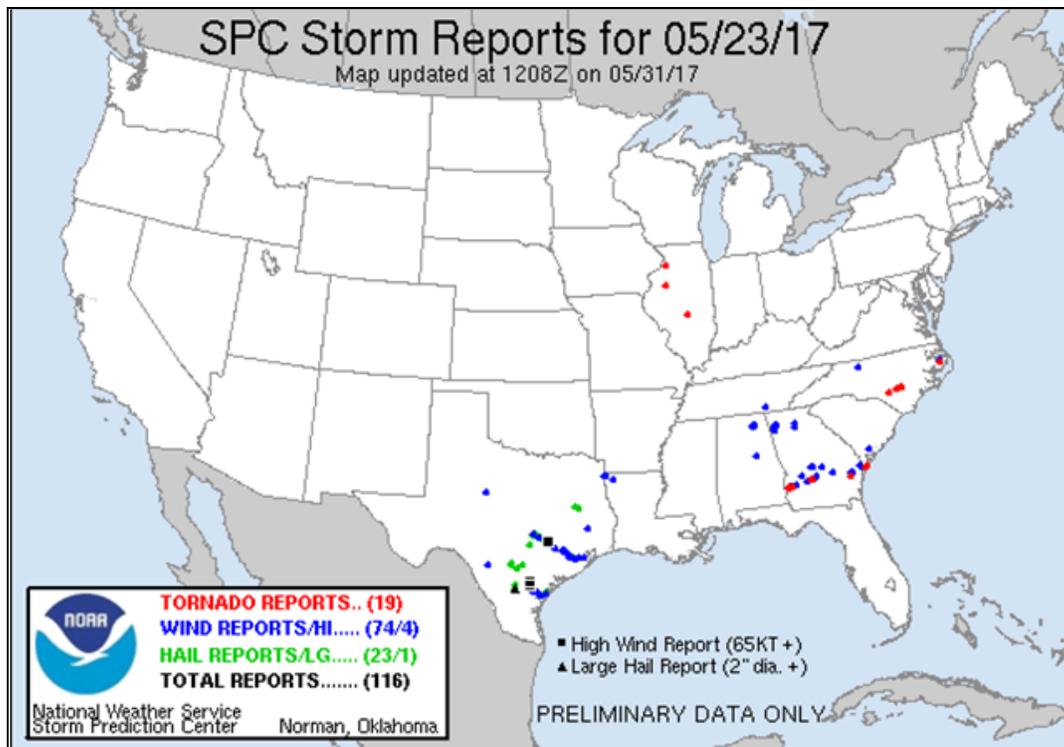
PUBLIC INFORMATION STATEMENT  
NATIONAL WEATHER SERVICE HOUSTON/GALVESTON TX  
1104 AM CDT Thu May 25 2017

...NWS DAMAGE SURVEY FOR 05/23/2017 SEALY THUNDERSTORM WIND EVENT...

.OVERVIEW...Severe thunderstorms moved rapidly across Southeast Texas Tuesday evening. The strongest of these cores moved over and just south of Sealy, TX just before 7 pm, and produced significant wind damage to trees, structures and utility poles. A survey team examined the damage, radar imagery, as well as videos and photos of the storm yesterday, and concluded the event was a very intense, wet microburst with winds that may have exceeded 80-100 mph. The most significant damage and winds began along or just northwest of I-10 a few miles west of Sealy and moved in an approximate 2 mile wide swath south of I-10 towards TX Highway 36. These wind speeds are equivalent of an EF1 tornado, except they were more straight-line associated with a downburst. Winds of this magnitude are rare in downbursts, but not unprecedented.

Evans

The supercell then continued southeast to Fort Bend County with damage being reported between 7:15pm CDT to 7:50pm CDT. After about 7:30pm CDT the supercell became a move linear line type storm cluster and lost supercell characteristics. The storm cluster moved through the coastal areas after 8:00pm CDT and offshore. Below is a map from the SPC showing damage reports across the country for May 23<sup>rd</sup> 2017



# 2017 Hurricane Season Outlook

**By Ron Havran  
CoCoRaHS Houston/Galveston  
Regional Coordinator**

NOAA's 2017 Atlantic Hurricane Season Outlook indicates that an above-normal or near-normal hurricane season is most likely. The outlook indicates a 45% chance for an above-normal season, a 35% chance for a near-normal season, and a 20% chance for a below-normal season. The Atlantic hurricane region includes the North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico.

The outlook calls for a 70% probability for each of the following ranges of activity during the 2017 hurricane season, which runs from June 1st through November 30th:

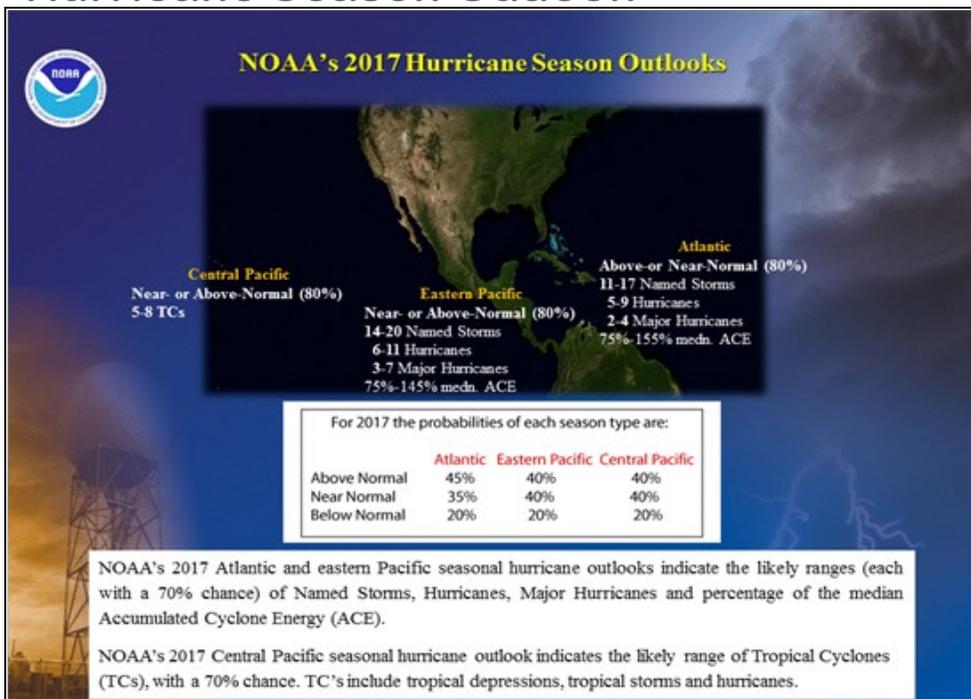
- 11-17 Named Storms, which includes Tropical Storm Arlene in April
- 5-9 Hurricanes
- 2-4 Major Hurricanes

Accumulated Cyclone Energy (ACE) range of 75%-155% of the median, which includes Arlene in April

The seasonal activity is expected to fall within these ranges in 70% of seasons with similar climate conditions and uncertainties to those expected this year. These ranges do not represent the total possible ranges of activity seen in past similar years. These expected ranges are centered near or above the 1981-2010 seasonal averages of 12 named storms, 6 hurricanes, and 3 major hurricanes. Most of the predicted activity is likely to occur during the peak months (August-October, ASO) of the hurricane season.

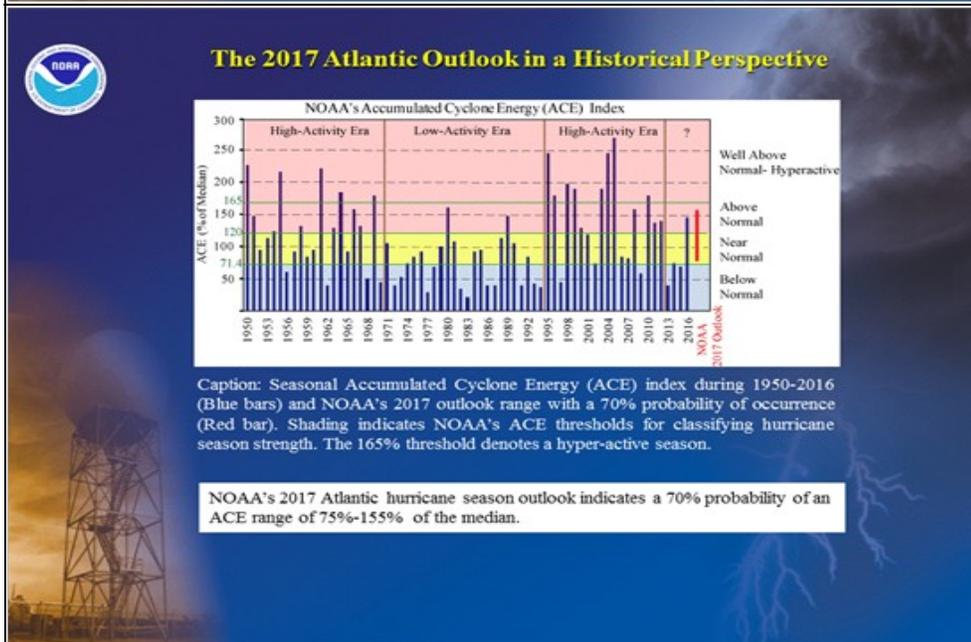
The image at the top of the page shows the Eastern Pacific, Central Pacific, and Atlantic Basin seasonal forecast with probabilities of each season type. All three basins are forecast to have near normal or above normal number of named storms for 2017.

An important measure of the total seasonal activity is NOAA's Accumulated Cyclone Energy (ACE) index, which accounts for the combined intensity and duration of named storms and hurricanes during the season. This outlook indicates a 75% chance that the 2017 seasonal ACE range will be 75%-155% of the median. According to NOAA's hurricane



NOAA's 2017 Atlantic and eastern Pacific seasonal hurricane outlooks indicate the likely ranges (each with a 70% chance) of Named Storms, Hurricanes, Major Hurricanes and percentage of the median Accumulated Cyclone Energy (ACE).

NOAA's 2017 Central Pacific seasonal hurricane outlook indicates the likely range of Tropical Cyclones (TCs), with a 70% chance. TC's include tropical depressions, tropical storms and hurricanes.



Caption: Seasonal Accumulated Cyclone Energy (ACE) index during 1950-2016 (Blue bars) and NOAA's 2017 outlook range with a 70% probability of occurrence (Red bar). Shading indicates NOAA's ACE thresholds for classifying hurricane season strength. The 165% threshold denotes a hyper-active season.

NOAA's 2017 Atlantic hurricane season outlook indicates a 70% probability of an ACE range of 75%-155% of the median.

season classifications, an ACE value between 71.4% and 120% of the 1981-2010 median reflects a near-normal season. Values above this range reflect an above-normal season and values below this range reflect a below-normal season. See image above.

**Reasoning behind the outlook**

NOAA's 2017 Atlantic hurricane season outlook reflects three main factors during August-October:  
 (1) Either ENSO-neutral or weak El Niño conditions are expected over the tropical Pacific Ocean

CONTINUED ON Page 18 —————>

## 2017 Hurricane Season Outlook (continued)

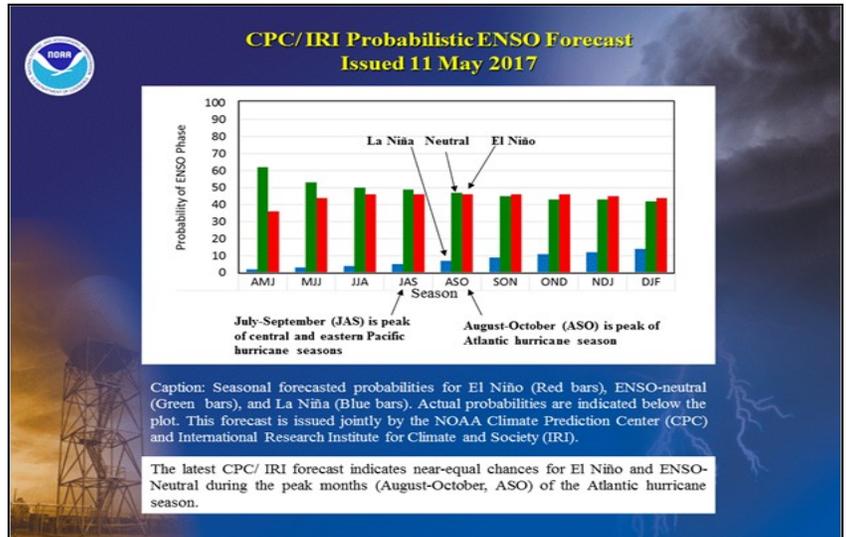
CONTINUED FROM Page 17—>

ENSO refers to El Niño/ Southern Oscillation, which has three phases: *El Niño*, *Neutral*, and *La Niña*. See figure 1 at right.

2) Near- or above-average sea-surface temperatures (SSTs) across much of the Atlantic hurricane Main Development Region (MDR, which includes the tropical North Atlantic Ocean and Caribbean Sea between 9.5°N and 21.5°N latitude), and

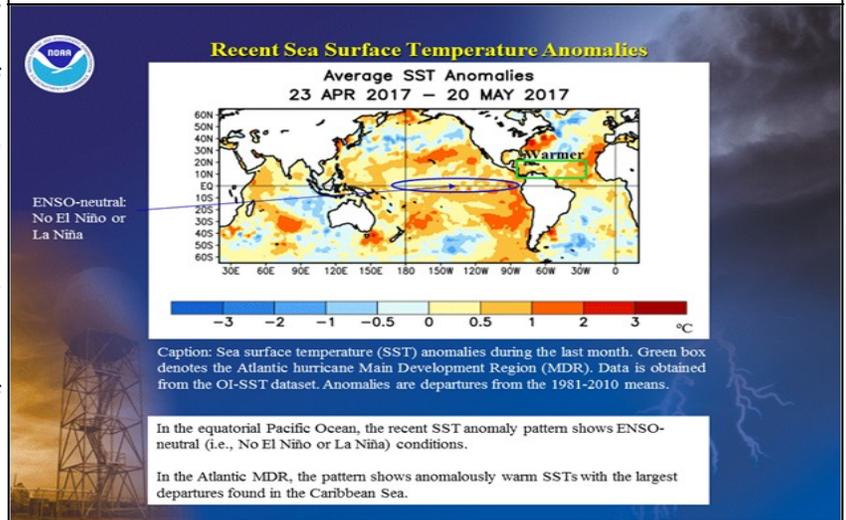
(3) Near-average or weaker-than-average vertical wind shear in the MDR.

There is currently large model forecast uncertainty regarding both oceanic and atmospheric predictions for August-October 2017. This uncertainty is reflected in the forecasts for ENSO, and for forecasts of SSTs and vertical wind shear in the MDR. The combination of ENSO-neutral, a warmer MDR, and weaker vertical wind shear within the MDR would likely yield levels of activity near the higher ends of the predicted ranges. The combination of El Niño, a cooler MDR, and near- or above-average vertical wind shear in the MDR, would likely yield levels of activity toward the lower ends of the predicted ranges. Recent SST anomalies are shown in figure 2 at right.



Above: Figure 1

Below: Figure 2



# 2017 Atlantic Tropical Cyclone Names\*

Arlene	Harvey	Ophelia
Bret	Irma	Philippe
Cindy	Jose	Rina
Don	Katia	Sean
Emily	Lee	Tammy
Franklin	Maria	Vince
Gert	Nate	Whitney

\*Names provided by the World Meteorological Organization

Be prepared: Visit [hurricanes.gov](http://hurricanes.gov) and follow @NWS and @NHC\_Atlantic on Twitter.

May 25, 2017

# Hail and Tornadoes hit South Plains/Lubbock region

## By National Weather Service WFO Lubbock

A slow moving and vigorous upper level storm system combined with rich Gulf moisture to produce several rounds of severe weather over the southern High Plains. The initial round of severe weather stayed in eastern New Mexico during the afternoon and evening of Monday, May 8th. However, as the storm system edged closer to the region from the west, thunderstorms developed into the western South Plains the next evening.

A couple of particularly intense supercell (rotating) thunderstorms roamed the western South Plains much of Tuesday evening. The most intense storm tracked slowly northeastward from near Morton past Sudan, dropping very large hail and torrential rain as it did so. It also produced several strongly rotating wall clouds and two brief tornadoes, one northeast of Morton and another near Sudan. Thankfully the tornadoes only lasted a few seconds and occurred over open country, so they didn't cause any damage. The largest hail reported back to the NWS was tennis ball sized observed 4 miles south of Enochs. In addition, 2 to 4 inches of rain fell in Muleshoe over a couple of hours, causing widespread street flooding.

The storms didn't call it quits with the setting sun, as is often the case here in West Texas. Instead, increasing lift with the approaching upper level storm system kept clusters of thunderstorms going all night, though they gradually decreased in strength through the early morning hours. One fairly intense storm even blew through Lubbock between 4 and 5 am with strong winds, small hail and a brief but intense downpour.

The thunderstorms did eventually fade shortly after dawn on Wednesday. This lull did not last though as another round of severe thunderstorms quickly redeveloped Wednesday afternoon (10 May 2017) along and ahead of an eastward moving dryline. One particularly intense storm formed over the northeast South Plains and then tracked eastward across the northern Rolling Plains. This storm dropped hail to at least baseball size as it tracked over Cee Vee. It also produced a brief tornado west of Swearingen over open land.

The briefly tornadic storm moved eastward and eventually produced a few more short-lived tornadoes near the Texas and Oklahoma line along the Red River. Additional severe storms formed behind this initial severe storm, dropping baseball sized hail near Brice and golf ball sized hail over parts of Memphis.

The images below show a couple of the larger hailstones that fell across the southeast Texas Panhandle and northern Rolling Plains Wednesday afternoon and evening. The activity eventually shifted eastward out of the area by mid-evening, allow-

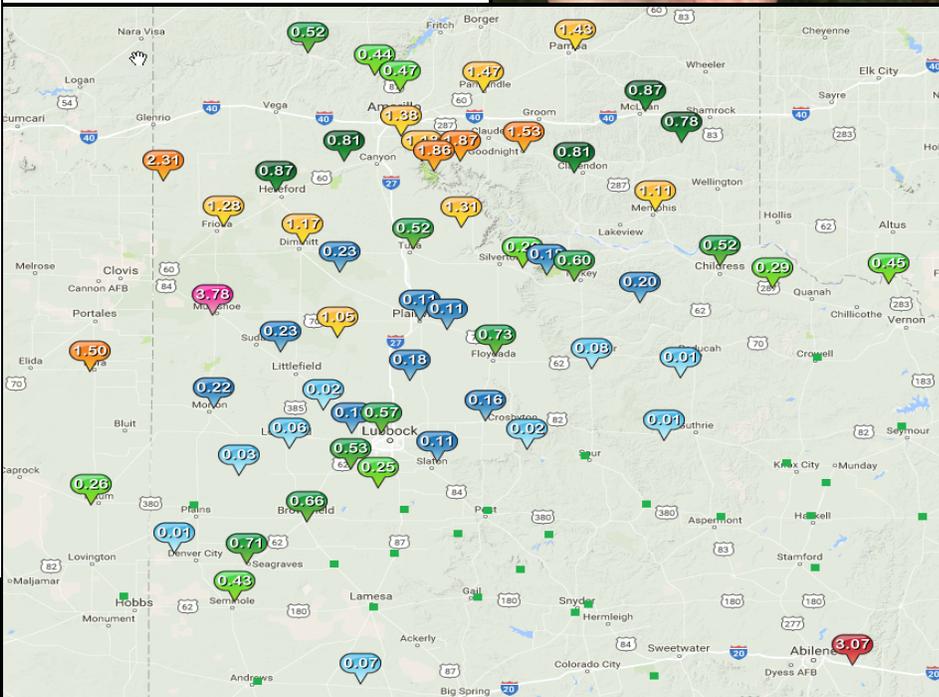
Between Tuesday afternoon and Wednesday evening many spots, aside from the southeast South Plains and much of the central and southern Rolling Plains, received some beneficial rains. The heaviest rain was confined to the southwest Texas Panhandle and northwest South Plains where 1 to 4 inches of rain was common. South and east of there rain totals were lighter, though several spots still had upwards of an inch.

Officially the Lubbock Airport recorded 0.45 inches of rain and the Childress Airport received 0.49 inches of rain. The below graphic shows the distribution of the rainfall, as measured by the West Texas Mesonet.

**Right: Hail that fell in the town of Cee Vee during a thunderstorm during the afternoon and evening on May 10, 2017. Photo by Neweta Quinn Carroll via National Weather Service-Lubbock**  
**Below: 2-day rain totals ending at 5 am on May 11, 2017.**



**Above: Hail that fell during thunderstorm in Memphis, Texas on May 10, 2017. Photo by: Kelli Maddox via NWS Lubbock.**



# Near record warmth for the Rio Grande Valley

By National Weather Service WFO Brownsville/Rio Grande Valley

**Overview** It began to get old. For beach lovers and others who enjoy the “Valley Wind Machine” and very warm to hot temperatures, April 2017 was ideal: Surf zone (first sandbar) water temperatures average at or above 80°F, almost unheard of for the entire month of April, and the final week of April was the cherry on top of the already warm cake, with three of the final five days reaching triple digits along and west of US 281/IH 69C, including a full-Valley triple digit spike on April 26th that set an all-time April record in Brownsville (104°F) and caused a “flash drought” situation for many, as fine fuels (grasses and brush) dried out rapidly and became tinder. Parts of the month were relatively pleasant, including the second to last week of the month which followed the last of April’s rains which ended early on April 18th. Otherwise, the only other significant weather event of the month was rapidly-developed hailstorms in northern Cameron and Willacy County on April 2nd. An explosively developed hailstorm over the Zapata County ranchlands may have produced hail the size of baseballs during the evening of April 29th .

**The Year So Far** The headline is not a misprint. McAllen/Miller Airport only slipped to #2 warmest, breaking a three month streak of warmest months in 2017! Regardless, #2 is still a notable accomplishment in a 56 year sample, particularly following the three prior months at #1 in 2017, and three of the final six months in 2016 also at #1! The following rankings were noted at McAllen/Miller Airport for each month of the ten month heat wave (day and night combined):

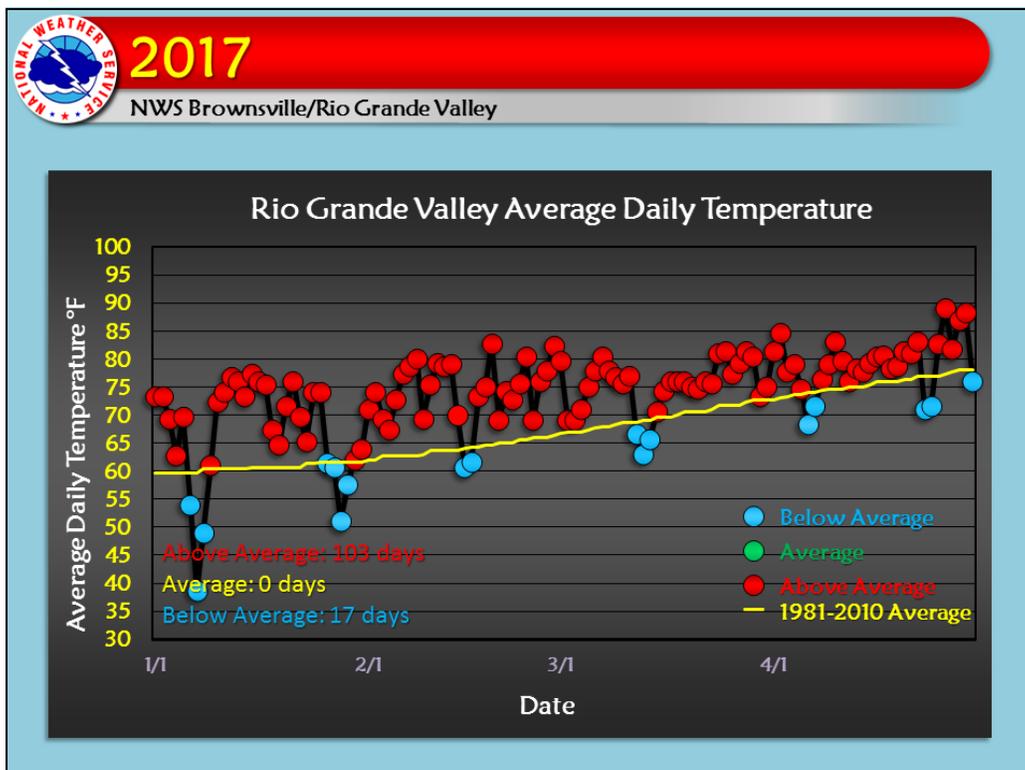
- July 2016: #2 (91.3°F, current record 92.8 in 2009)
- August 2016: #2 (90.7°F, current record 91.4 in 2009)
- September 2016: #1 (88.8°F, prior record 87.7 in 2011)
- October 2016: #1 (82.9°F, prior record 81.7 in 2004)
- November 2016: #1 (75.6°F, tie – 75.6 in 1994)
- December 2016: #3 (67.9°F, current record 69.4 in 1984)
- January 2017: #1 (67.7°F, prior record 66.7 in 1989)
- February 2017: #1 (75.3°F, prior record 71.4 in 1962)
- March 2017: #1 (76.3°F, prior record 76.2 in 2016)

The following are a few impressive temperature statistics, since the big heat began ten months early (July 2016): • For the “big three” Valley locations (Brownsville, Harlingen, and McAllen), the following was recorded:

- o **Brownsville** (since 1878): Average temperature – 77.3°F. Difference from #2: +2.1 degrees. Difference between #2 and #10: +0.8 degrees! Bottom line? Like Secretariat in the Belmont, the 2016/17 ten month record accelerated from the pack . By near three times as much!
- o **Harlingen** (since 1912): Average temperature – 77.2°F. Difference from #2: +2.2 degrees. Difference between #2 and #10: +0.8 degrees! Secretariat, again .
- o **McAllen/Miller** (since 1961): Average temperature – 79.8°F. Difference from #2: +2.7 degrees. Difference between #2 and #10: +1.8 degrees.

**It’s All Warm to Hot in 2017** ... but as the season warms up, the departure from average began shrinking as one might expect – after all, it gets a bit more difficult to routinely stay ~10 degrees above average when average begins moving into warm to hot territory, as it does in April. At month’s end, daily highs range from the upper 80s to lower 90s east to west, and morning lows through the 60s.

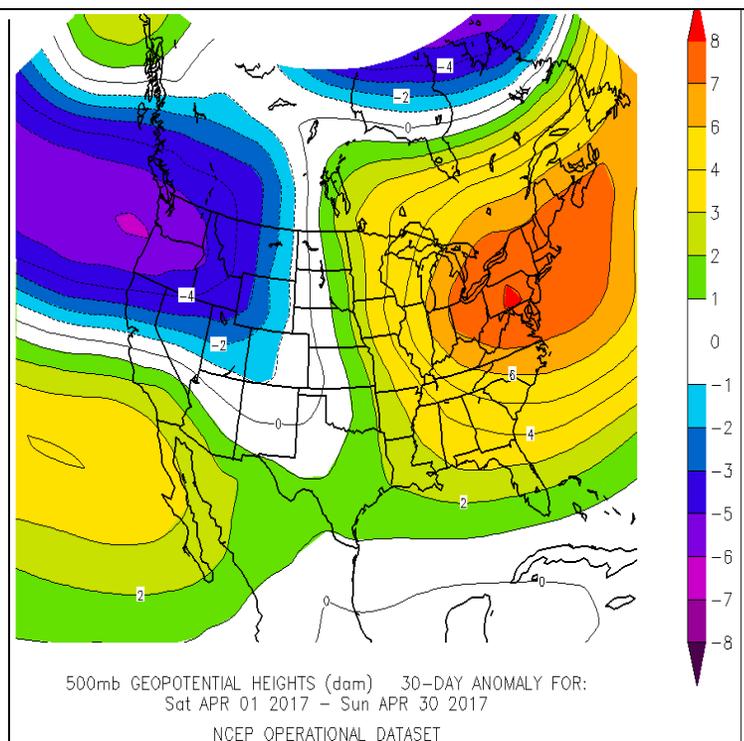
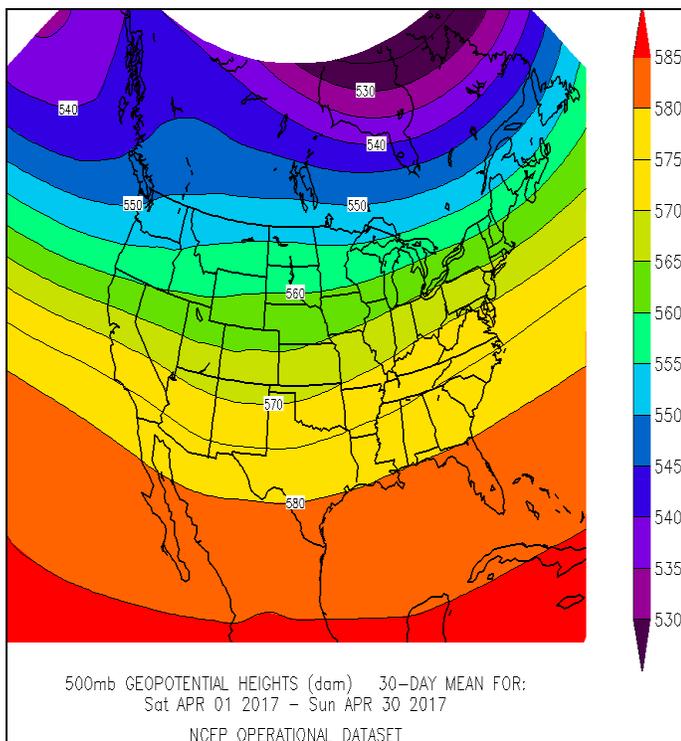
CONTINUED ON PAGE 21—>



# Near record warmth for Rio Grande Valley (continued)

## Pattern Matters

Similar to late March, the pattern across the United States featured a “flat” trough across the southwest U.S. with a flat ridge across the eastern seaboard (figure 2). In most cases, the height of the 500 millibar pressure surface was above the long term average (figure 3), regardless of troughing or ridging. The sole exception was across the Pacific Northwest and intermountain northern Rockies, which also had the only slice of below average temperatures in the United States (figure 4).

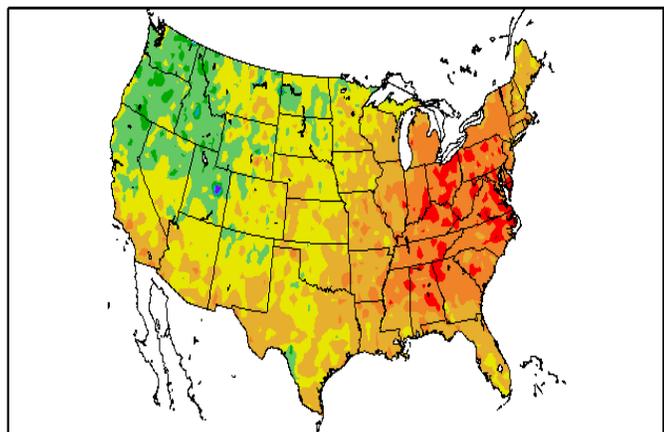


Above: Figure 2

Below: Figure 4

Figure 3

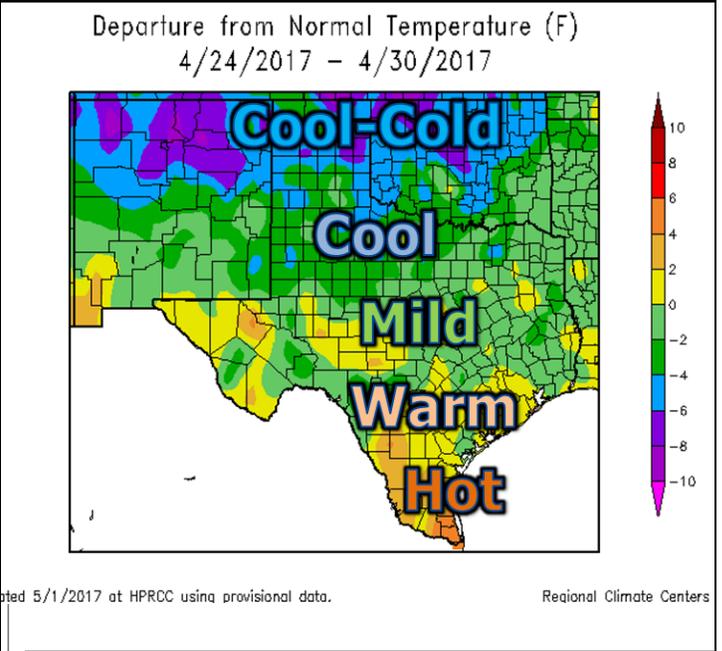
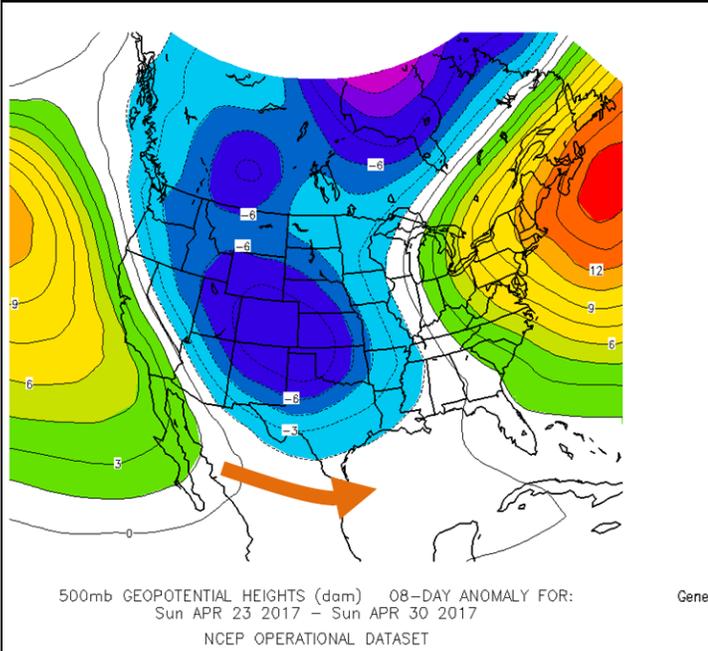
Departure from Normal Temperature (F)  
4/1/2017 - 4/30/2017



The general position of the eastward moving upper level disturbances remained just far enough north to keep the necessary lift well north of the Rio Grande Valley, but also favored deeper layers of “downslope” flow (arrow, figure 5 Page 22) from the Sierra Madre toward the coast, including all of the southern tip of Texas region. This was shown classically during the final week – and weekend (April 28-30) – of the month. While winter weather raged in the form of near blizzard conditions in Amarillo extending northward into the Oklahoma Panhandle and western Kansas on the 29th and 30th, the Rio Grande Valley sweltered through a triple-digit Saturday along with heat index values above 110°F! The week that was April 23-30 shows this clearly in terms of the steering pattern departures from average (low over Oklahoma to “near normal” over the Rio Grande Valley), with temperatures on the whole ranging from cool/cold in northwest Oklahoma (10 degrees below average) to hot in the Rio Grande Valley ( 4 to 6 degrees above average).

# Near record warmth for the Rio Grande Valley (continued)

## The Pattern...and the Weather Last Week of April 2017



Above: Figure 5

Above: Figure 6

### April 2017 Temperatures rankings

#### Maximum 30-Day Mean Avg Temperature for MCALLEN MILLER INTL AP, TX

Click column heading to sort ascending, click again to sort descending

Rank	Value	Ending Date	Missing Days
1	82.3	2011-04-30	0
2	81.0	2017-04-30	0
3	80.8	1967-04-30	0
4	80.6	1991-04-30	0
5	80.5	1999-04-30	0
6	80.4	1963-04-30	0
7	80.3	2006-04-30	0
8	80.1	2016-04-30	0
9	79.8	2012-04-30	0
10	79.6	2009-04-30	0

Period of record: 1961-01-14 to 2017-05-01

#### Maximum 30-Day Mean Avg Temperature for Brownsville Area, TX (ThreadEx)

Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date	Missing Days
1	80.5	2011-04-30	0
2	80.1	1967-04-30	0
3	79.8	2006-04-30	0
4	79.1	2012-04-30	0
5	79.0	2002-04-30	0
6	78.7	1929-04-30	0
7	78.6	2017-04-30	0
8	78.5	1963-04-30	0
9	78.4	1922-04-30	0
10	78.1	1894-04-30	0

Period of record: 1878-01-01 to 2017-05-01

## CoCoRaHS Training and Tips

### How to verify your observation was entered correctly on the website?

By Ron Havran, CoCoRaHS Houston/Galveston Regional Coordinator

There are two simple ways to verify each day that the measurement you made of your CoCoRaHS gage has been entered into the database on the website correctly. The first way is to go to search "Daily Precipitation Reports" and enter the county you are in and the days date for start date and end date. Hit the search box and wait a few seconds for all observations in that county to fill in the page. Locate your stations number and then find the view icon and click on that to view the report you just made. This is quick check to verify that you didn't mistype the rainfall amount or enter an incorrect total for the day's precipitation amount. Also take a look at all rainfall amounts entered for a county on that morning. If something seems odd about the amount you entered compared to all the other stations in the county then check some of these observations from these stations for any comments about rainfall or storm information. Compare this information to your observation and weather you have observed in the last 24 hours. The second way to verify your information entered for your observation is correct and to see how it compares to other stations is to click on "Maps" and go to "Precipitation Maps". From here you can go to "Classic" or "New" map selection. Enter your county name and the date then hit the "Get Map" box. A map of your county will appear with all observations made that morning. Check to see how your amount entered compares to the closet stations in your county. These two methods will help you in making sure your data entered into the database is error free and will be a valuable asset to users of CoCoRaHS data.

**View Data : List Daily Precipitation Reports** [US Units]

**Search Daily Precipitation Reports**

Station Fields:  Station Number  Station Name

Location: [USA] [Texas] [HRR - Harris]

Date Range: Start Date: [6/9/2017] End Date: [6/9/2017]

Precip Value: [All Precip Values] Operator: [ ]

Searched: Stations in Harris, Texas. Report date on 6/9/2017.

Showing 26 Records.

Date	Time	Station Number	Station Name	Total Precip in.	New Snow in.	Total Snow in.	State	County	View	Maps
6/9/2017	5:30 AM	TX-HRR-168	Pearland 4.0 ENE	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	6:00 AM	TX-HRR-27	Bunker Hill Village 3.6 NNW	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	6:00 AM	TX-HRR-117	Tomball 2.7 ENE	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	6:00 AM	TX-HRR-122	Mission Bend 0.8 N	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	6:00 AM	TX-HRR-124	Spring 7.1 WSW	0.00	NA	NA	TX	Harris	Classic	New
6/9/2017	6:00 AM	TX-HRR-139	Cloverleaf 1.7 W	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	6:00 AM	TX-HRR-228	Katy 5.2 E	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	6:12 AM	TX-HRR-238	Webster 3.9 NNW	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	7:00 AM	TX-HRR-15	Kingwood 3.9 S	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	7:00 AM	TX-HRR-28	Webster 0.4 NW	0.00	0.0	NA	TX	Harris	Classic	New
6/9/2017	7:00 AM	TX-HRR-31	Friendswood 2.5 NNE	0.00	0.0	NA	TX	Harris	Classic	New

**Maps : Daily Precipitation**

Map Type: [Precipitation] Map Location: [Texas] [HRR - Harris] Date: [6/9/2017] Colors: [Standard]

Daily Precipitation (inches .xxx), for the 24 hour period ending -7:00 am  
Harris County, Texas 6/9/2017

## Summer is now here and daily zeros are just as important as a daily rainfall amount!

Please remember to report days with no rainfall as a complete precipitation record of your station is critical data for many different users and researchers of CoCoRaHS data. The National Drought Mitigation Center uses CoCoRaHS daily zeros data as top source of data in the United States in making Drought Monitor Maps across the country. So each day that you report that your station had zero rainfall that data is being used every week in the making of a new drought monitor map for the United States. So please keep up the good job of reporting daily zeros for this valuable database to have accurate data across the country.

**What agencies or organizations are responsible for the USDM?**

The Drought Monitor has been a team effort since its implementation in 1999, produced jointly by the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Agriculture (USDA). The NDMC hosts the web home of the USDM and the associated data, and provides the map and data to NOAA, USDA and other agencies. It is freely available to the public, media and anyone else, via the web at <http://droughtmonitor.unl.edu/>.

**Who uses it, and what do they do with it?**

**Get involved!**

Want to contribute your observations to the USDM process? Here are some ways:

- 1) Talk to your state climatologist. You can find his or her name at the American Association of State Climatologists ([www.stateclimate.org](http://www.stateclimate.org)).
- 2) Email [droughtmonitor@unl.edu](mailto:droughtmonitor@unl.edu).
- 3) Use the contact form on [drought.gov](http://drought.gov) (<http://drought.gov/drought/contact>).
- 4) Become a CoCoRaHS observer ([www.cocorahs.org](http://www.cocorahs.org)) and submit drought reports along with daily precipitation observations.
- 5) Submit reports, rain or shine, to the Drought Impact Reporter (DIR, at <http://droughtreporter.unl.edu>) at regular intervals - annually, seasonally, or monthly, as feasible. Reports submitted directly to the DIR can include photos, and we recommend a systematic technique such as using photo points to document range condition. For how-to information, please see [Tracking Drought Impacts on Rangeland](http://drought.unl.edu/ranchplan/Overview/TrackingDroughtImpacts.aspx) (<http://drought.unl.edu/ranchplan/Overview/TrackingDroughtImpacts.aspx>) or information on submitting condition reports, found on the DIR site.

Email: [DroughtMonitor@unl.edu](mailto:DroughtMonitor@unl.edu)

# What is the U.S. Drought Monitor

Maybe you've seen it in that map of the U.S. painted...

## NDMC News

### Using CoCoRaHS observations to fine-tune drought maps

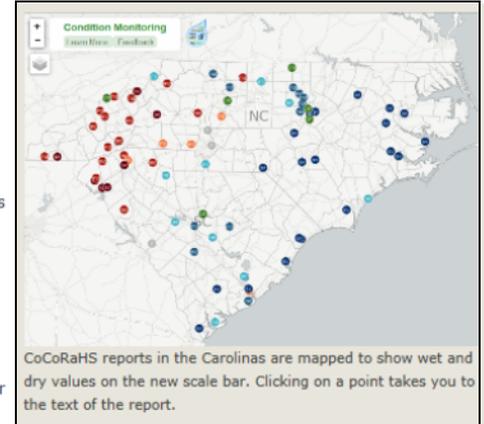
Oct 14, 2016

**Editor's Note:** CoCoRaHS, a network of citizen scientists who report precipitation or the lack of it, was established in 1998 in Colorado and has since established a presence in every state in the country. In 2013, the Carolinas Integrated Sciences & Assessments team began cultivating a network within a network, CoCoRaHS volunteers who are specially trained to observe drought-related impacts in the Carolinas. As a result, there are more CoCoRaHS reports about drought in those states. In October 2016, working closely with the CISA team, CoCoRaHS added a scale bar to its condition monitoring reports, which most people expect will make them even more useful.

By Rebecca Ward, Extension Climatologist, State Climate Office of North Carolina

As a member of North Carolina's Drought Management Advisory Council (DMAC), my role in the council's weekly teleconferences is to give a brief overview of recent weather, namely precipitation and temperatures, and how these fit into a climatological perspective. This includes sharing statistics, such as the temperature and precipitation rankings for individual sites across the state for various periods of time, or discussing what drought indices, such as the Standardized Precipitation Index, are indicating across the state. In addition to these meteorological data, I also try to share recent CoCoRaHS condition monitoring reports, particularly from areas where dryness is of concern.

To understand the value these reports have, it is important to first share a bit more about the NC DMAC's process for providing input to U.S. Drought Monitor authors. As I mentioned, I typically begin the calls discussing recent weather and climate. This is followed by a National Weather Service hydrologist who discusses what to expect over the coming days and weeks. Following this is a "round-the-horn" update from the USGS about streamflow and groundwater levels across the state, reservoir level and status information from the U.S. Army Corps of Engineers, Tennessee Valley Authority, and Duke Energy, forest fire information from the NC Forest Service, and agricultural reports from the NC Cooperative Extension. Depending on the week and how severe conditions are, other groups may also contribute information. Following this, we take a look at the U.S. Drought Monitor author's draft of the week's map and discuss what the data is showing. Then, we break out the pen (or computer mouse) and figure out where the lines delineating different categories of dryness fall based on the data.



All of this information, with the exception of the extension agent reports, is objective, and most is station-based. The extension reports provide invaluable information about agricultural conditions for the counties or districts they come from. They are the only consistent source of on-the-ground impacts information we receive, but these are only available during the growing season and not every county has a report every week. This is where (in my opinion) CoCoRaHS condition monitoring reports can fill a gap by

## Upcoming Wx Talk Webinars:

**Thursday, July 13, 2017 - 1:00PM EDT**

### **Mesoscale convective systems: Bringing both beneficial rains and hazardous weather to the central and eastern US**

Russ Schumacher  
Dept of Atmospheric Science  
Colorado State Univ.  
Fort Collins, CO



**(Biography)**

*A major portion of the summertime rainfall in the central United States comes from "mesoscale convective systems", or MCSs: large lines or clusters of storms that regularly move across the country. In many years, the regularity of these MCSs is what provides the rainfall to support the thriving agriculture activity in the central US. But a lack of MCSs in some years can mean drought, and an overabundance of them can result in significant flooding. Although much is known about the general conditions that are favorable for MCSs to develop and last for many hours, it remains very challenging to predict their precise location or the specific amount of rain they will produce: in fact, summer heavy precipitation is among the most difficult aspects of the weather to predict.*

*In this presentation, I will give an overview of different types of MCSs, and what they look like when observed by radars and satellites. I will address some of the challenges associated with predicting MCSs—and the potential of forecasting systems currently under development—as well as some of their impacts. Lastly, I will share some insights gained from recent field research campaigns, including the "Plains Elevated Convection At Night", or PECAN, project that took place in the summer of 2015.*

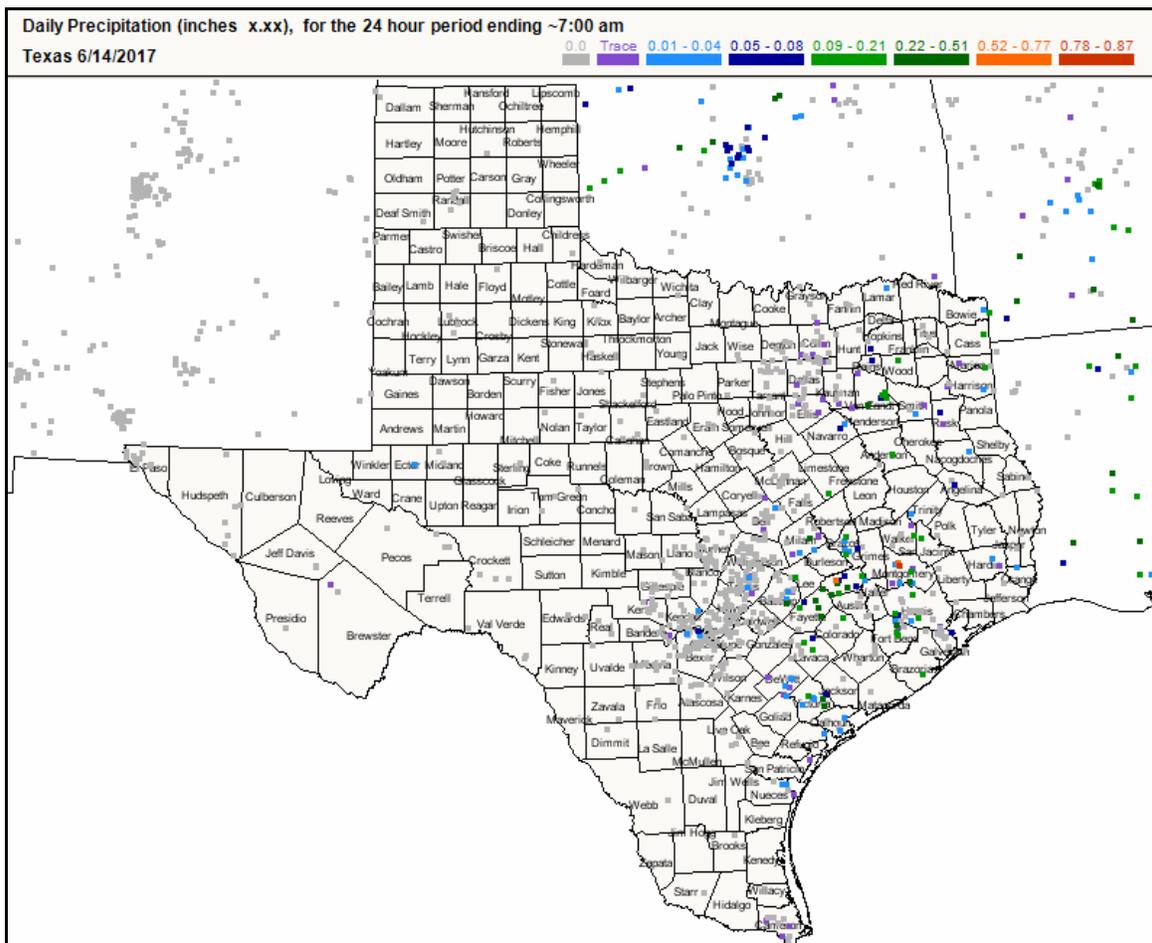
# Big Thanks for our Quality Control Guru

By Ron Havran, CoCoRaHS Houston/Galveston Regional Coordinator

We at CoCoRaHS would like to give a big shout out to H. L. Lovell of our quality control team. H. L. is the co-coordinator of Dallas County and also takes care of quality control of all submitted daily and multi-day reports across the state of Texas.

H. L. volunteers many hours of his time to find potential errors in data across the state. This is a major reason that the final mapped data for the state is as accurate as possible for all the users of CoCoRaHS data. H. L. researches possible issues and contacts observers for verification of submitted data values.

Thanks to H. L.'s hard work for keeping data errors out of the final climate data for the state of Texas.



## NWS Corpus Christi Regional Rainfall Summary

County	March		April		May		Spring Total
	Avg	Max	Avg	Max	Avg	Max	
Aransas	4.99"	7.31"	0.66"	0.83"	3.71"	4.33"	9.36"
Bee	2.38*	2.38*	1.36"	1.90"	1.64"	2.58"	5.38"
Calhoun	1.57"	2.70"	2.23"	3.82"	4.98"	6.08"	8.78"
Duval	4.33"	5.30"	1.76"	2.10"	3.05"	4.30"	8.19"
Goliad	2.65"	3.35"	2.77"	3.98"	2.25"	3.20"	7.67"
Jim Wells	3.59"	4.85"	0.59"	1.21"	2.16"	3.93"	6.34"
Kleberg	3.76"	3.97"	1.27"	1.34"	4.45"	4.77"	9.48"
LaSalle	1.78"	2.71"	1.20"	2.11"	2.74"	3.32"	5.72"
Live Oak	3.30"	6.16"	0.69"	2.20"	1.36"	2.29"	5.35"
McMullen	4.38"	4.62"	1.57"	1.98"	2.24"	2.64"	8.19"
Nueces	3.57"	5.54"	1.26"	2.21"	4.92"	6.67"	9.75"
Refugio	2.46"	3.45"	2.33"	3.10"	2.85"	5.25"	7.64"
San Patricio	4.09" *	4.09" *	0.80"	0.97"	5.10" *	5.10" *	9.99"
Victoria	4.51"	8.11"	2.75"	5.28"	2.80"	5.19"	10.06"
Webb	2.17"	3.89"	3.24"	6.30"	3.86"	6.14"	9.27"

\* indicates only on station reported in that county.

## NWS Brownsville Regional Rainfall Summary

County	March		April		May		Total
	Avg	Max	Avg	Max	Avg	Max	
Brooks	3.84"	4.86"	1.35"	1.47"	2.47"	2.80"	7.66"
Cameron	1.76"	2.85"	0.59"	2.16"	1.98"	3.06"	4.33"
Hidalgo	4.01"	7.17"	1.25"	2.05"	1.98	3.37"	7.24"
Jim Hogg	NR	NR	NR	NR	NR	NR	NR
Starr	2.83"	3.15"	1.55" *	1.55" *	3.66"	5.35"	8.04"
Willacy	5.73" *	5.73" *	1.73" *	1.73" *	2.26" *	2.26" *	9.72"



## Texas CoCoRaHS Observer

The official newsletter of Texas CoCoRaHS

Newsletter Editors: **Juan Alanis Jr.**, Co-Regional Coordinator - Corpus Christi Region  
cocorahsstx@gmail.com

**Ronald Havran**, Regional Coordinator - Houston/Galveston Region  
cocorahs.hou.galv@gmail.com

Texas CoCoRaHS: **William (Bill) Runyon**, Texas State Coordinator



Texas CoCoRaHS  
CoCoRaHS of South Texas



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